The Mining Journal

Established 1835 — Railway & Commercial Gazette

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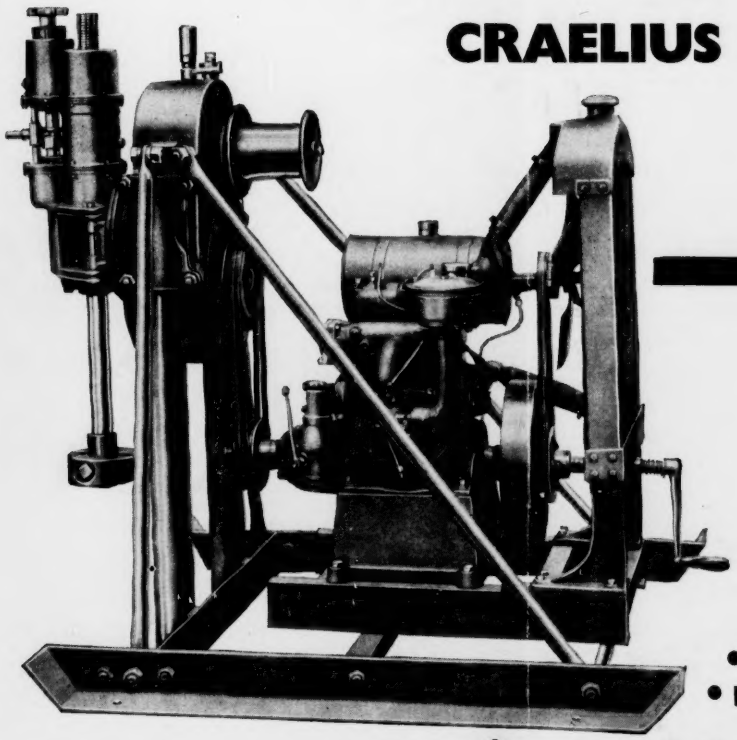

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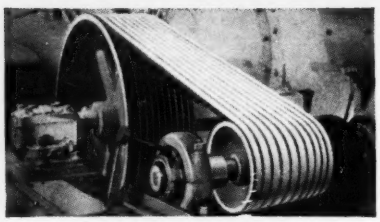

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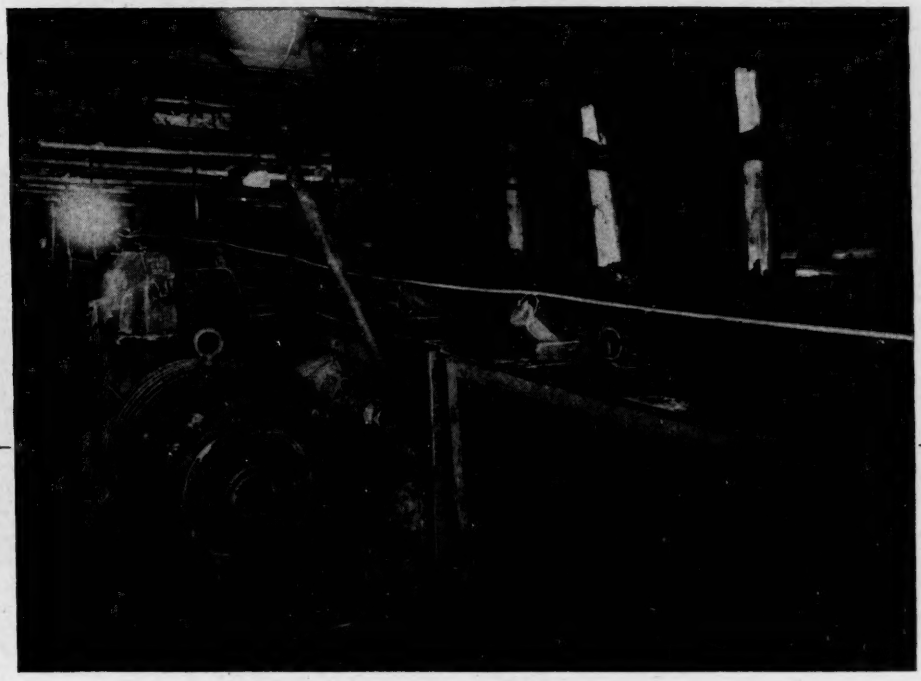

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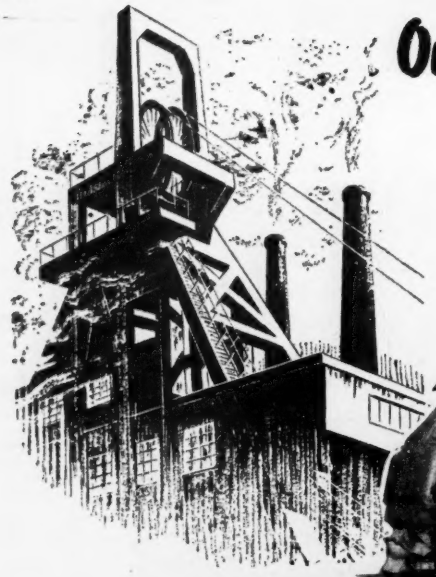

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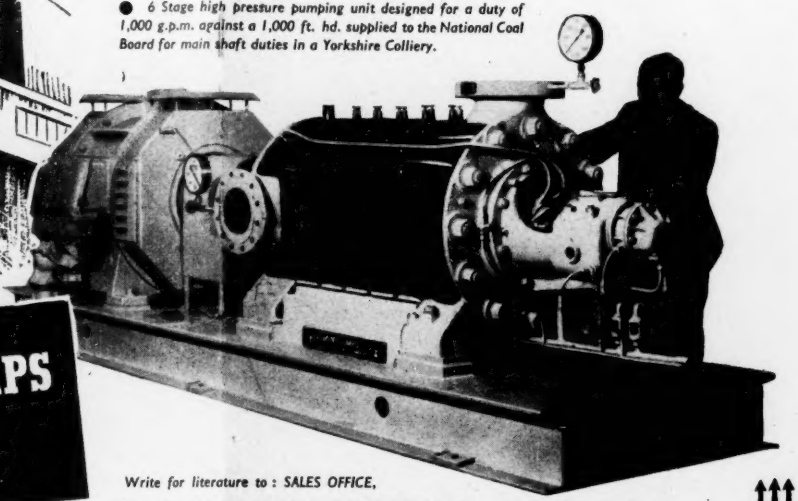

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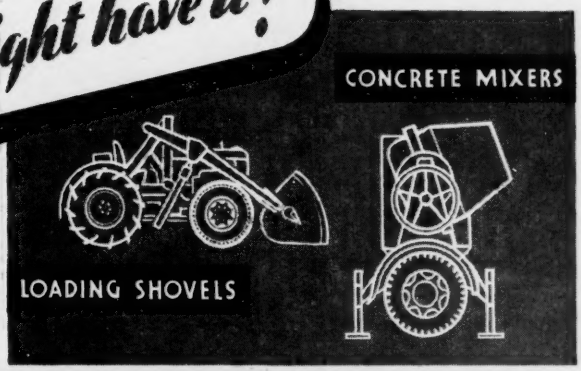

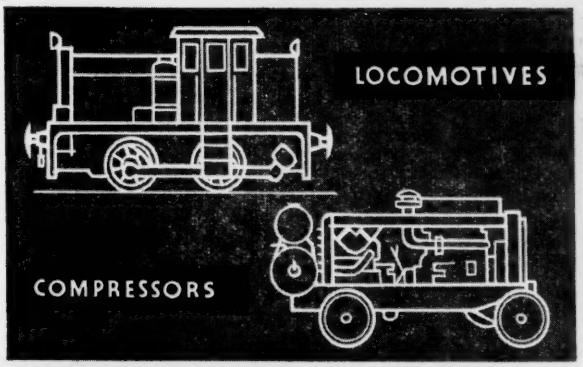

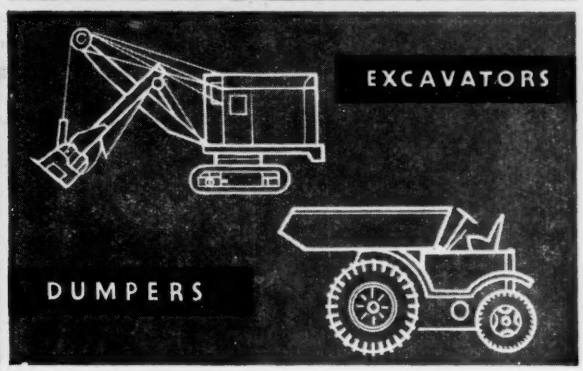

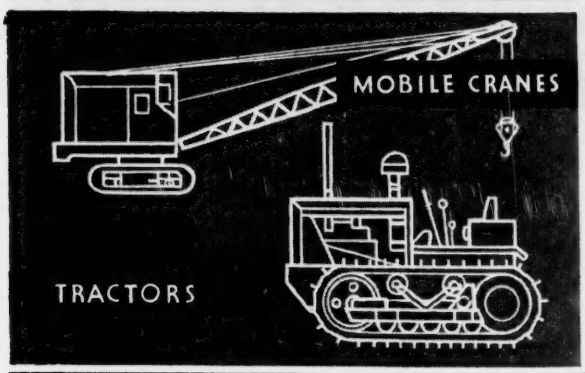

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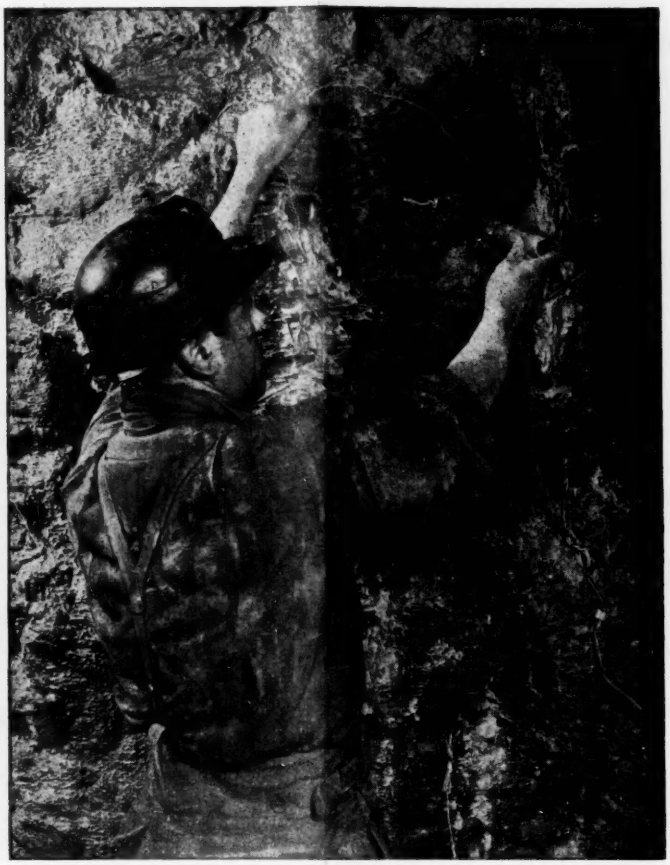

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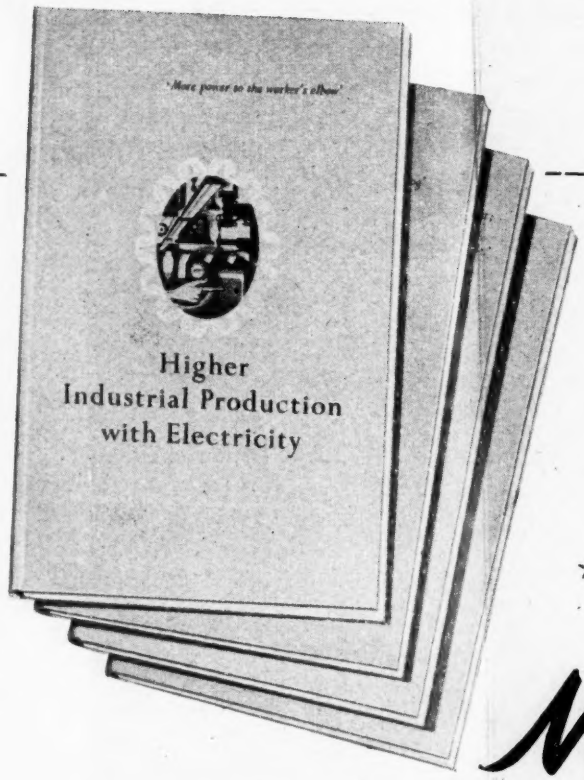

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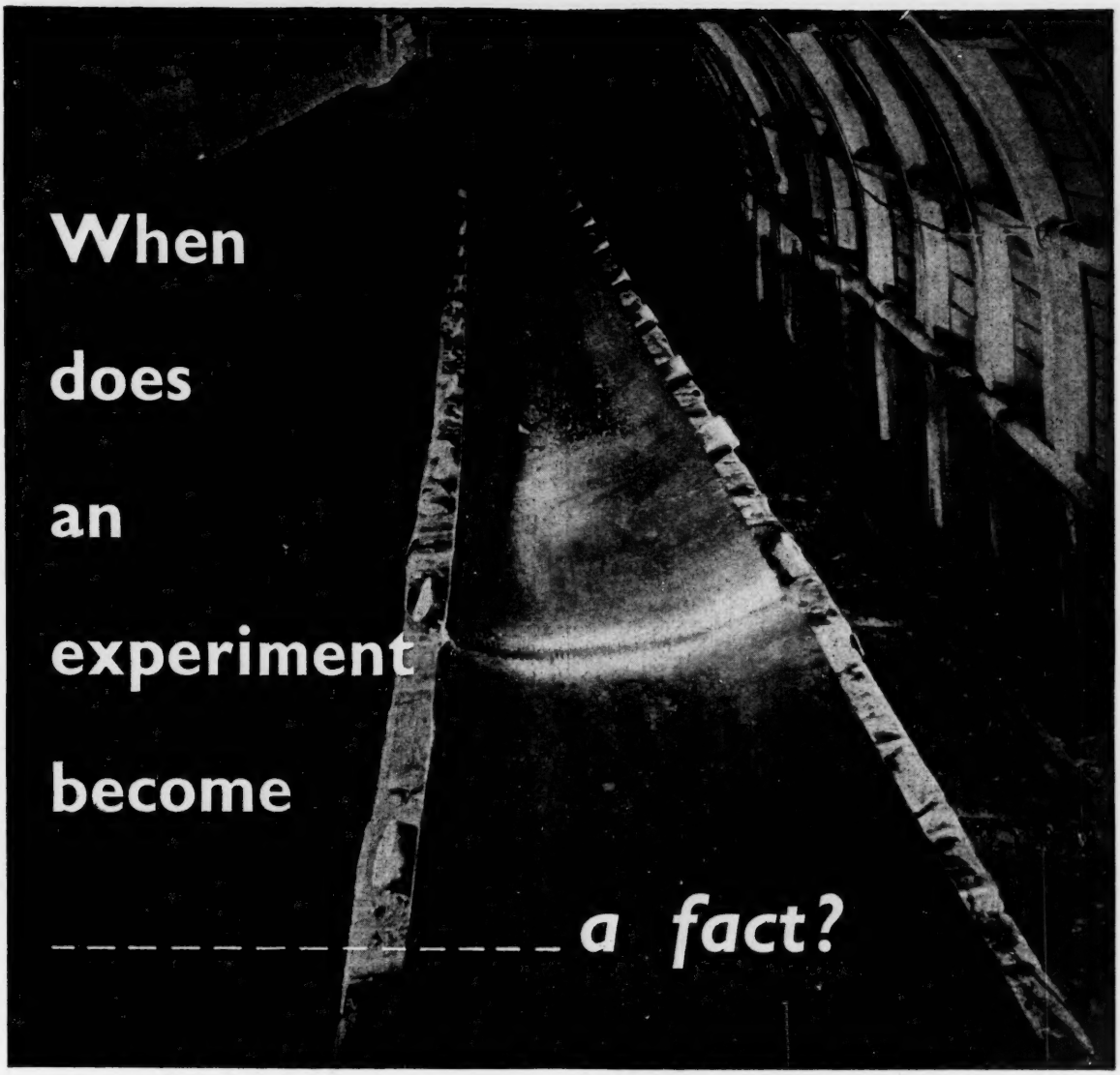

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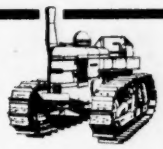

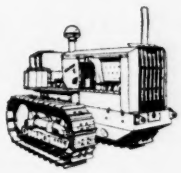

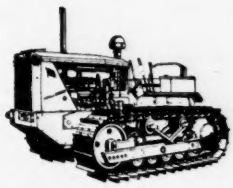

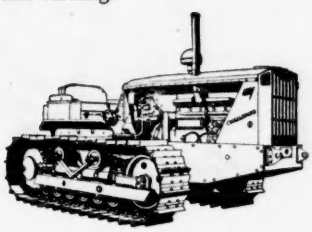

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NOTES AND COMMENTS

The South African Elections

Dr. Malan and the Fundamentalist School of thought triumphed last week in the Union elections. This result was generally anticipated though the endorsement given to the Nationalist party programme was even larger than expected. The result will be somewhat widely regretted in this country because with our necessarily limited knowledge of all the conditions it seems to foreshadow a period of increasingly bitter political and social strain.

The Boer mentality is strongly political and in this differs from that of the white immigrant, whose preoccupations are economic. It is, of course, far too early to forecast what will be the outcome in the highly complex conditions existing in South Africa to-day, but it is quite possible to consider some of the implications as they affect mining in the nearer future without necessarily involving the political and social aspects.

Native labour in South Africa to-day is short of what is desiderated, and will doubtless become more so as more big new mines come into production especially in the Orange Free State. The most obvious remedy for this would be to up-grade the native worker and allow the semi-skilled man, of whom there are many, to be more extensively employed in working the many mechanical aids which applied science is ever increasingly placing at the disposal of management to meet labour shortage or demands for uneconomic wage-rates. The strong reaffirmation in the election of the colour bar must further hamper this prospect.

Again, it is at any rate arguable that the more liberal policy which Sir Godfrey Huggins has proclaimed in his recent Rhodesian success may tend to induce migrant labour, on which the Rand considerably depends, to choose increasingly the countries north of the Limpopo and render the Union increasingly dependent on its indigenous coloured population. The ordinary mine native on the Rand is not yet for the most part politically conscious. He comes to the mines to earn wages whereby he and his family in the reserves can garner the wherewithal to maintain such a standard of existence as he requires, and growing economic forces make such labour increasingly necessary. He is fully segregated in the compounds where he is well lodged, fed and looked after. The effects of an increasingly strict segregation will be felt mainly by the labour employed in the big industrial centres already detribalized where the discomforts of being confined to native settlements at a serious distance from their work has long promoted discontent.

It is, however, on the social and political aspects of Dr. Malan's striking victory that attention is likely primarily to turn. The South African Premier has left us in little doubt of his preference for the conversion of the Union to a sovereign independent republic. He, and his followers, are the lineal and intellectual children of the *Voortrekers* as epitomized in President Kruger. Such a fundamentalist ideal may seem quite impracticable under world conditions of to-day, especially when there is no counterveiling military power such as Germany was in those days, on which he could rely to support him against the British Commonwealth and Empire. In these days perhaps nothing is impossible but, we cannot imagine Dr. Malan allying himself with the Communist principles of the Soviet. The financial and commercial nexus between South Africa and the United Kingdom and United States may well make any such ambition unrealizable.

Another aspect of the issues emphasized by Dr. Malan's victory is the question of a fundamental change in the constitution of the South African Union as provided for at the time of its creation, both as regards the right to subordinate the judicature to parliament and the provisions for the maintenance of bi-lingualism. On the basis of one man, one vote, it seems fairly clear that the Nationalist Party is in the minority and it seems difficult to see, unless there is some subversion of the constitution, how this position is to be altered. Any prolonged constitutional struggle between two more or less equally balanced political contestants is bound to make for financial hesitation and, as we know, hesitation is apt to spell stagnation.

U.S. Tariff Policies

Much has been heard both inside and outside the United States regarding the liberalization of the United States protective policy regarding imports from abroad, encouragement of which has been one of the keynotes of President Eisenhower's utterances during and since the Presidential campaign. Foreign nations anxious to establish, or at least improve their balance of trade with the U.S. and, in particular, to fortify their currencies by the acquisition of more dollars, have welcomed the general tenor of the President's standpoint. But inside the United States it has long been evident that any such policy would encounter strong opposition in Congress.

Immediately after the Presidential Elections it was stressed that the Republican victory was largely the President's and not the Party's. But however true this conclusion may have been, it by no means follows that the President will be able to override the wishes of the Legislature in this matter. This week will see the opening phases of the struggle begin with hearings on the extension of the Reciprocal Trade Agreements Act towards the end of June. It is, of course, a commonplace that the original framers of the sacrosanct American Constitution sought to erect a three-way barrier to future change by giving to the President, the Legislature and the Judicature powers of restraint *vis-a-vis* of one another which however well-designed to render change difficult, are not favourable to adaptation to changes in the world's progressive economic structure.

The influences in Congress adverse to a more liberal economic policy are strong. Public opinion in the United States has not yet awoken to the logical development of an external policy corresponding to its world creditor position. The instinct is always to look inwards and not outwards, and it is inevitable that industrial leaders should look with distaste on the prospect of having to fight for their output not merely with one another but with a large number of foreign competitors whom they consider have an advantage through the existence abroad of a lower level of subsidence, and consequently of costs, and this despite the contention so frequently urged by ex-President Hoover that by and large cheap labour is not so economical as higher paid and more technically efficient operatives.

Nor is it only the representatives of big manufacturing companies but the whole of the domestic mining interest which fears to see metal and mineral prices depressed by an increase in foreign supplies, and they are strongly seconded by the great labour Unions anxious above all to see wage-rates increased and liable to support their objectives by strikes. Another, though possibly less potent influence is the fact that, broadly speaking, a more liberal economic policy was favoured by ex-President Truman's Democratic administration and must consequently entail a certain amount of narrow party allegiance to its contradiction.

Last year, before the United States elections, the apprehension was occasionally expressed that if President Truman were re-elected, he might be stalled by an adverse majority in Congress. Now, *mutatis mutandis*, the same position may occur as between the new President and the new Congress. The paralysis of initiative experienced when ex-President Hoover was largely rendered impotent by an adverse Congress majority will not be readily forgotten.

Another influence which may easily reinforce opposition to any tariff liberalization is the fear in the United States that the era of high prices and maximum demand may be further impaired by the prospect of the relaxation of international tension and the piling up of armanents. Conferences between Mr. Churchill and President Eisenhower and between Mr. Butler and leading members of the United States' administration have been represented as highly favourable indications of a new spirit in American opinion more in harmony with her dominating position as the world's creditor nation. But before we take these assurances too readily we must know how far the President really speaks with United States opinion behind him, and how far the dead hand of the constitution-makers at the end of the 18th century will cramp his progressive views.

Five Year Steel Plan

In the British steel industry's post-war development plan, first priority was accorded to the re-equipment of the tin-plate industry of South Wales. That task is now approaching completion. Production of tin-plate is now running at the rate of nearly a million tons a year, the old hand mills have been superseded by up-to-date plant unsurpassed, and indeed unequalled, by any other in the world, and South Wales has now outdistanced all other areas as the leading centre of steel production in the kingdom.

Now the North-east takes up the challenge, with the great Dorman Long combine in the van of progress. Announced this week is the third stage of this company's post-war development which will add £36,000,000 to the £14,000,000 already expended. It is a well-balanced project embracing the provision of a new coking plant capable of carbonizing 1,300,000 tons of coal per annum, the erection of two mammoth blast furnaces with a joint capacity of 750,000 tons per annum, a new steel plant to increase ingot output by 625,000 tons, and the erection of new rolling mills which are designed to expand the production of finished steel by over half a million tons.

That an individual company with a nominal capital of no more than £7,500,000 should embark upon a project of this magnitude, bespeaks a firm confidence in the future of British steel, and the belief that the resultant economies in production costs will justify the colossal expenditures upon which the company has embarked. Hitherto all the Dorman Long developments have been financed out of the company's own resources but it would appear to be unprobable that Stage III can be carried to completion without recourse to the capital market.

Portugal

(From Our Own Correspondent)

Oporto, April 8

January production figures are, wolfram concentrates 257 tonnes; tin concentrates 123 tonnes; cupreous pyrites 61,193 tonnes; and iron ore 14,935 tonnes.

Exports for February in tonnes were, WO_3: U.S.A. 174, U.K. 216. SnO_2: U.S.A. 99. Cupreous pyrites 12,900. Roasted and leached pyrites 23,142. White arsenic 25.8.

The only item of interest in the export list is the 216 tonnes of WO_3 shipped to the U.K. As there is no record of any shipments of this material to Great Britain from the Northern ports during February this substantial consignment was no doubt shipped by the British group of mines holding a long term contract with the Ministry of Materials.

Full details of the so called "cassiterite scandal" are now in the hands of the police. The whole affair was conducted in a very amateurish manner from start to finish. Firstly, as is usual here, everybody talked too much. Secondly, too high prices were paid for the sweepings, residues, etc., bought by the parties from the plants holding stocks of such material, and excessive anxiety was shown to secure delivery. Thirdly, as might have been expected, the loss of the vessel on the return voyage from Lisbon to Oporto proved more than could be swallowed. The insurance company began to ask questions and got the police to make inquiries, as a result of which quite a lot of opportunists are behind bars and seem likely to remain there.

Public opinion here is asking first how it came about that a Bank paid out some £70,000 against a certificate of weight endorsed "metal content unknown," and secondly, how such a contract came to be signed between a well-known firm of buyers and men of straw.

Power for African Mining and Industrial Development

By A. G. THOMSON

The exploitation of Africa's mineral resources is both supplying a growing proportion of Western European needs and is so reducing Britain's dependence on dollar sources for essential materials, and is helping to open up the African continent by the establishment of industries based on indigenous materials. Rapid progress since the war has created an urgent need for the generation of power on a very large scale and its distribution over vast areas at economic costs. The solution lies in harnessing African rivers to industrial expansion by the establishment of hydro-electric undertakings. Since the war, the most notable projects considered have been the Volta River aluminium scheme, the Owen Falls power undertaking, the Kariba Gorge and/or Kafue River projects and the Shire Valley project. In the following article the author recalls each of these projects, pointing out the history, potentials and costs of each. With the exception of the Shire Valley project, Nyasaland, all the schemes discussed have received mention in comparatively recent issues of *The Mining Journal*

As long ago as 1924 the Gold Coast Government considered the possibilities of aluminium production on the Volta River. Commercial investigations which started in 1938 were interrupted by the war, but in 1945 they led to the formation of a company, West African Aluminium Limited, to carry the scheme forward. In 1947, Aluminium Limited acquired extensive bauxite concessions and in 1949 it secured an interest in West African Aluminium Limited. The Gold Coast Government appointed Sir William Halcrow and Partners in 1949 to investigate the potential value of the Volta River to the economy of the Gold Coast, and in August, 1951, the firm submitted a favourable report on the prospects of developing hydro-electric power for aluminium production. So far as it related to aluminium production, this report formed the basis for subsequent discussions between representatives of the United Kingdom, the Gold Coast Governments, and two aluminium companies. The purpose of these discussions, which were largely exploratory in character, was to consider the conditions under which the various interests might jointly participate in a scheme for aluminium production in the Gold Coast.

THE VOLTA RIVER ALUMINIUM SCHEME

The scheme resulting from these discussions was set out in a white paper published in November, 1952. It envisages the construction of a dam and power station at Ajena, which would raise the water level of the Volta River to a maximum height of 260 ft. above sea level and would create a lake with an area of some 2,000 square miles. From records of the river flow, which are available over a twenty-year period, it is estimated that the discharge could be regulated to give a continuous rate of 35,700 cu. ft. of water per second. By cutting through the Senchi and Kpong rapids below the dam to lower the tail water level, it is calculated that an output of 564,000 kW. of firm electric power could be developed.

Existing and estimated future demands for electric power in the Gold Coast are insufficient to justify the hydro-electric power without a heavy power consumer as the main outlet. It is therefore intended to set up an aluminium smelter in the vicinity of Kpong, some 12 miles from the dam site. After allowing 50,000 kW. for other users in the Gold Coast, the power available from the hydro-electric installation would be enough to produce 210,000 tons of aluminium a year. The smelter would draw its major raw material, bauxite, from deposits at Mpraeso and Yenahin, where reserves are estimated to exceed 200,000,000 tons, or sufficient for about 200 years' production at the maximum output of the smelter.

The establishment of an aluminium industry of this size would nessitate the construction of a new port conveniently situated to serve its needs. Sir William Halcrow and Partners recommend that this port should be constructed at Tema about 20 miles east of Accra. The Gold Coast Government, after obtaining a second opinion, have decided to proceed with the construction of the proposed port whether or not the scheme as a whole is undertaken, and preliminary work is now in hand. There would also need to be a considerable development of communications. It is expected that the main burden of new traffic would fall on the railways. The new port would have to be linked by rail to both Accra and the smelter at Kpong. The bauxite would also be moved by rail, new lines from Yenahin to Kumasi and from Koforidua to Kpong being required. The Gold Coast Government would be responsible for financing these public works and the townships which would come into being at the port and dam site.

The aluminium smelter and bauxite mines would be managed by private enterprise, the aluminium companies and the Gold Coast Government sharing in the provision of the equity capital. It would be the intention of the aluminium companies to proceed to a smelter capacity of 210,000 tons a year as rapidly as conditions allowed. In the first place, however, a capacity of 80,000 tons a year would be installed. The companies would undertake that, as far as possible, any technical discoveries made or acquired by them or by their associated companies would be made available to the Gold Coast Government on terms as favourable as those on which they were made available to any other associated company.

The Gold Coast Government and the aluminium companies would provide the equity capital of the smelter company, Aluminium Limited contributing the major part. All the capital attributable to the first 40,000 tons of annual capacity would be raised by the holders of the equity of the smelter company, but the scheme provides for capital assistance by the United Kingdom for expanding capacity from 40,000 to 80,000 and ultimately to 120,000 tons a year. The United Kingdom and the Gold Coast Governments would be jointly responsible for financing the hydro-electric power undertaking as a whole, the Gold Coast being solely responsible for facilities for the distribution of power to other users besides the smelter. It is proposed that a Volta River Authority and a Volta Electricity Board should be set up by the Gold Coast Government. The former would be responsible for building the dam and power station, while the latter would assume responsibility for the management of the power undertaking after its completion.

THE ESTIMATED COSTS

The estimated costs for the various stages of the power project are £45,500,000 for 80,000 tons, £49,500,000 for 120,000 tons and £54,000,000 for full development. The smelter company would require £29,000,000 to develop the bauxite mines, build towns at the mines and smelter, and construct and operate the smelter at an annual capacity of 80,000 tons. At capacities of 120,000 and 210,000 tons a year the corresponding figures would be £39,000,000 and £64,000,000 respectively.

The total costs, including public works, power project and smelter, are estimated at £100,500,000 for 80,000 tons,

£114,500,000 for 120,000 tons, and £144,000,000 for 210,000 tons. The United Kingdom would bear £43,300,000 of the cost for 80,000 tons, £52,300,000 for 120,000 tons, and £56,800,000 for 210,000 tons. In return, the smelter company would be under an obligation for thirty years from initial production to offer to buyers in the United Kingdom at least 75 per cent of the production.

While the United Kingdom Government favour participation, they consider that a scheme of such magnitude should not be embarked upon without every practicable assurance that it could be carried through to a successful conclusion. They proposed, therefore, with the agreement of the Gold Coast Government and the aluminium producers, that a Preparatory Commission should be set up at once to follow up the work which had been done already and examine the chief problems in greater detail. The appointment was recently announced of Commander R. G. A. Jackson, C.M.G., O.B.E., R.A.N., as Special Commissioner in charge of the Preparatory Commission. Commander Jackson will in the near future establish the headquarters of the Commission in the Gold Coast. It is expected that the work of the Commission will take 18 months to two years. The cost will in the first instance be met by the Gold Coast Government, but half of it will be reimbursed by the United Kingdom Government.

Lake Victoria, the world's third largest inland lake, has an area of 26,000 square miles and consequently has a very large storage capacity for a limited range of water levels. The total catchment area of the White Nile at its source at Ripon Falls is 103,000 square miles, of which the lake itself represents almost exactly a quarter. Nearly two miles down the White Nile from Lake Victoria, the main channel of the river is narrowed considerably by a spur of rock just below the Owen Falls. The width of the river at this point is about 500 ft. and the bed consists of extremely hard rock. From the Lake to Owen Falls the river has cut a channel through the plain with occasional rock bars which form a series of minor falls. The mean discharge of the river is about 22,000 cu. secs.

THE OWEN FALLS SCHEME

The Owen Falls hydro-electric scheme in its present form originated in 1946 from a report on the development of Uganda's resources which the Governor, Sir John Hall, asked Mr. C. R. Westlake to prepare. The Uganda Electricity Board was formed in 1947 to take over the assets of the existing power company and develop the water power resources of the Victoria Nile. Westlake was made chairman of the Board, and two British firms—Sir Alexander Gibb & Partners for the civil engineering work and Kennedy & Donkin for the electrical and mechanical work—were commissioned to prepare a project report for the Owen Falls scheme, together with the construction of two thermal generating stations at Jinja and Kampala. These stations were required to replace existing capacity in order to meet rising demand until the hydro-electric supply became available. By the end of 1948 contracts had been let for all the electrical and mechanical plant and in September, 1949, the contract for the civil engineering work was awarded to the Owen Falls Construction Co. (a group of eight civil engineering constructors in which three British firms participate). The Board envisages an ultimate expenditure of between £15,000,000 and £16,000,000 on the scheme, and is confident that the tariffs offered to industry will be competitive with those in almost any part of the world.

At the request of the Egyptian Government, it was agreed to build the dam one meter higher than necessary for the requirements of the power undertaking. The Egyptian Government approved finance amounting to £4,500,000 for the scheme, most of which is to compensate people whose livelihood will be disturbed by raising the level of the lake. The final plans were approved by the Egyptian Ministry of Public Works and the Uganda authorities, after extensive experiments to calibrate the sluices had been made with models at the Imperial College, South Kensington, under the direction of Professor White, Ph.D., D.Sc.

The total length of the main dam, together with the dams on each side of the power station forebay and the intake dam at the power station, will be 2,727 ft. with a maximum height of 85 ft. At the site of the work the river has dropped 60 ft. in level below the lake and its width at the dam will be about 1,300 ft. The station is designed for an ultimate installed capacity of 150,000 kW. made up of 10 alternators of 15,000 kW. each, driven by Kaplan turbines designed to operate under a head of water which may vary between 57½ ft. and 72½ ft., maximum flow through each turbine being 3,600 cu. secs.

Work on the dam was started early in 1950. The rate at which plant is installed will depend to some extent on the development of Uganda's mineral resources. Good progress has been made with the undertaking, and it is expected that the water level of the lake will be raised early this year. The first 15,000 kW. of hydro-electric power should be available by September, 1953, and a further 45,000 kW. by the middle of next year.

EARNING POWER OF CAPITAL INVESTMENT

The financial success of any large hydro-electric scheme must depend on the earning power of the capital investment, which in turn depends on the effective demand for the power produced. The very large potential consumption within a hundred miles of Jinja includes Jinja itself and the towns of Kampala and Entebbe, phosphate workings near Tororo, and gold mines near Busia. A new cement works has been opened at Tororo and plans which have been discussed provide for the establishment of various industries including copper smelting, the production of iron and steel, and the foundation of a chemical industry.

At one time it seemed possible that the Kilembe Company might develop its own hydro-electric scheme in the neighbourhood of the mines, utilizing streams from Ruwenzori Mountain to generate current. This company, which was registered in Uganda for the development of copper deposits on the western boundaries of that mountain, is an associate of Frobisher Ltd., of Toronto. By an agreement signed in Canada duplication of hydro-electric schemes has been avoided. Subject to the approval of the Uganda Electricity Board and the Government of Uganda Protectorate, it was arranged that Kilembe Mines should take its current from the Owen Falls, and that a £2,000,000 sterling transmission line should be constructed from the power station to the mine, on the basis of a substantial capital contribution by the mining company to the Uganda Electricity Board, together with an annual payment for 11,000 kW. of power. It was reported that planning of the gigantic task of laying the cable across Uganda would be put in hand immediately.

A NEW COMPANY

A few months ago representatives of the Rio Tinto Company Ltd., Frobishers Ltd., Kilembe Mines Ltd., Monsanto Chemicals Ltd., African Explosives and Chemicals Ltd., and various consultants, visited Entebbe for discussions with the Uganda Government and the Uganda Development Corporation. The conference resulted in an agreement to form a company to be known as the Tororo Exploration Co. Ltd. for further exploration and, in due course, working of niobium, phosphates and magnetite deposits which surround the Sukul Hill near Tororo. Prospecting, proving and laboratory examination of the deposits have been actively carried out by and on behalf of the Government and responsibility for these operations was recently transferred to the Uganda Development Corporation Ltd. It is

the hope of the Protectorate Government that these minerals will be extracted and separated to ensure the establishment of an industry producing phosphorous, superphosphates, fertilizers, and at a later stage iron and steel products. Plans are now under consideration for the manufacture of sulphuric acid at the Kilembe copper mine. When the Owen Falls hydro-electric plant comes into operation, adequate power will be available to make possible the electric smelting of both phosphorous and iron. If all the projects now being discussed by Uganda are carried out, however, the full capacity of the Owen Falls station might not be enough, in which case further stations might be built lower down the Victoria Nile where suitable sites are possible.

KARIBA GORGE AND KAFUE RIVER

For many miles the Zambesi River forms the boundary between the two Rhodesias, in each of which the accelerating tempo of economic development is reflected by a very rapid increase in the demand for electrical power. In Northern Rhodesia the Copper belt is at present the main consumer of power and the immediate load from that area has been estimated at 100,000 kW. The power requirements of the copper mines are safeguarded till 1960 by existing sources of supply, supplemented by potential imports from the Belgian Congo. After 1960, however, additional sources of power will be essential to further expansion. In Southern Rhodesia the demand from the Salisbury-Midlands area alone is expected to be between limits of 270,000 kW. and 380,000 kW. in 1962, depending on the rate of growth.

According to the Minister of Trade and Industrial Development, Mr. W. A. E. Winterton, it will only be possible to produce cheap power in Southern Rhodesia when some large hydro-electric scheme is in operation. In fact, a rise in the price of electricity was forecast by the Minister of Mines, Mr. G. A. Davenport recently, when he opened a new milling and reduction plant at Filabusi. The Minister pointed out that about £5,000,000 was required for Wankie Colliery, but the profits of this undertaking no longer represented an attractive return on capital, nor did they permit adequate reserves to be built up. In the circumstances, the Rhodesian Government had no alternative but to agree to a higher price for Wankie coal, although the increase must inevitably be passed on to mining and industrial consumers, including the Copperbelt.

Two schemes for providing the Rhodesias with low-cost power for future expansion have been put forward. The larger project involves harnessing the Zambesi at Kariba Gorge to generate 385,000 kW. in the first stage at an estimated cost of £43,500,000 (at prices ruling in November, 1950). Full development of this site would enable about 1,000,000 kW. to be generated at a total cost of nearly £75,000,000. The other scheme is a smaller one for harnessing the Kafue River, which is a tributary of the Zambesi running through Northern Rhodesia.

Both schemes were referred for investigation to the Inter-Territorial Hydro-Electric Commission, a body set up by the Central African Council in 1946. The reports of the commission and its advisory panel were made to the Central African Council in May, 1951, since when they have been under consideration by the governments concerned. The commission fully endorsed the opinion of the advisory panel that the Kariba project was an unusually favourable one and that the cost of energy therefrom would be low by any standard. The consulting engineers recommended that this scheme should be carried out first, and in order to have this undertaking in operation by 1961 or as soon as possible thereafter ; and that while the work was in progress further investigations of the Kafue scheme should be made. The suggestion was made that eventually the Kafue station could be constructed, if needed, as an extension of the Kariba scheme when the latter had been developed to its full capacity.

Having regard to the large sum required to complete the first stage of the Kariba scheme, together with the prospect that additional electric power would be required by both territories before any power could be obtained from Kariba, the Northern Rhodesian Government decided to obtain further information about the Kafue gorge scheme. A committee headed by Sir William Halcrow, of Sir William Halcrow and Partners, which recently reported to the Economic Secretary of the Northern Rhodesian Government, has put forward detailed plans for the development of power from the Kafue. During its passage through the 22-mile gorge, the Kafue River falls more than 1,900 ft. and by damming it near the upper end of the gorge a net head of about 1,700 ft. could be utilized to generate power. The dam would be 600 ft. long at the crest and the height above the river bed would be 100 ft. The scheme is so arranged that there would be two power stations of equal capacity at different points, with an estimated 257,000 kW. at 80 per cent load factor (with a minimum of 186,000 kW. in the driest years) divided between them. There would also be a tunnel some 13½ miles long with sufficient capacity to enable output to be increased to 418,000 kW. by the installation of additional generating plant. The power would be transmitted to a central switching station, and thence north and south by single-circuit lines carried on lattice steel towers. Receiving substations would be set up at Norton in Southern Rhodesia and near Lusaka and N'Kana in Northern Rhodesia.

It is considered that operation at the first power station could start within five years of the date of a decision to proceed with the scheme and that the lower station could be in full operation in 6¾ years. Thus the full development could be completed well before the earliest date at which power from the first stage of the Kariba gorge project could be available. The cost is estimated at £18,100,000 for the hydro-electric works and £9,500,000 for transmission lines.

The Halcrow report points out that large capital expenditure for load development would not be required, since the entire output of the power stations could be absorbed by the copper mining companies and by the Southern Rhodesia Electricity Supply Commission. In fact, the demand for both Rhodesias is likely to be so high that all power generated could be disposed of from the date the scheme came into operation, a full return on the capital expended thus being assured.

SHIRE VALLEY PROJECT

An impetus to minerals exploration and industrial development in Nyasaland and neighbouring territories should result from the Shire Valley project, which is under consideration. The waters of Lake Nyasa have their natural outlet in the Shire River, which in turn flows into the Zambesi River. Both Lake Nyasa and the Shire River are of great importance to the economic development of Nyasaland, but the vagaries of their behaviour have made it impossible to assess the benefits which might otherwise have been obtained from their use. For many years the Government of Nyasaland has had under consideration the possibility of artificial stabilization or control of the level of the Lake and the use of the waters of the Shire River for the production of hydro-electric power and also for irrigation. A survey undertaken by an irrigation engineer, following investigations by various experts, has shown that control of the waters of the Lake and river is feasible and that these waters have great economic potentialities. As a result of this work, the Nyasaland Government decided to appoint Sir William Halcrow and Partners to undertake a full-scale survey, which would cover all aspects of the project—planning, engineering, economic and financial. This survey will probably take two years or more.

The Properties of Hafnium Metal

During the last two years the separation of hafnium from zirconium has become a semi-commercial proposition, and the raw material is available for the manufacture of hafnium metal. Reserves of hafnium may be regarded as considerable because of the fact that the metal remains a byproduct of zirconium, which itself is not in scarce supply. Hafnium does not constitute the major element in any ore. The following article, condensed from *Engineering Newsletter Vol. 4, No. 3*, outlines the properties of hafnium and shows its relationship with zirconium. References to the remarks made in The Paley Report concerning zirconium were published in *The Mining Journal* of October 3, last year.

Hafnium is one of the metals which in recent years has been produced in ductile form for the first time, together with titanium and zirconium. The latter two recently reached the commercial stage, but hafnium is just leaving the laboratory. Hafnium was isolated and named only 30 years ago, was a laboratory curiosity two years ago, but it is now in production by the iodide process, and rods which weigh as much as 12 lb. are available.

Hafnium and zirconium occur together in ores, the hafnium content ranging from 0.2 to 15 per cent of the zirconium content. Many of the properties of hafnium and zirconium are similar, with separation difficult and best performed by chemical means. After separation, metallic hafnium is usually obtained by the methods which are used for zirconium : that is, by the iodide or the Kroll process. Iodide hafnium contains less than 1 per cent of zirconium.

Like zirconium, hafnium combines readily with all but the noble gases. Oxygen dissolves readily in the metal, usually making it permanently brittle. No deoxidizers are known and hence careful melting practice is needed in order to obtain ductile metal. The crystal bar which is obtained in the iodide process can be melted in an arc furnace under argon to obtain massive hafnium which is suitable for further working. In this form, the rate of oxidation is sufficiently low to permit hot-working in air. By a combination of hot- and cold-working procedures, metal has been produced in the form of sheet and wire.

A HIGH MELTING POINT

Hafnium, zirconium, and titanium have melting points which are considerably higher than those of the more common constructional materials, with hafnium having the highest melting point of the three. The density of hafnium is twice that of zirconium, and is somewhat greater than that of lead. Though its electrical conductivity is only 6 per cent that of copper, it is twice as good a conductor as titanium and a somewhat better conductor than zirconium. Its modulus of elasticity is the highest of the three metals, and is halfway between that of aluminium and that of steel.

Hafnium crystal bar has a hardness, as deposited, of about Rockwell B 78. After arc melting and annealing, the hardness is practically unchanged. However, in a material that has been cold-worked with a 60 per cent reduction, the hardness increases to Rockwell B 102. At 1380° F., hafnium and zirconium oxidize at the same rate ; but at 1650° F. the rate of oxidation of hafnium is only about half that of zirconium.

RESISTANCE TO MINERAL ACIDS

In resistance to mineral acids, hafnium more nearly resembles titanium than zirconium. However, all three materials are about equally resistant to 10 per cent sulphuric acid, while hafnium is superior to the others in resistance to a one-to-one mixture of hydrochloric and sulphuric acids. All three metals show excellent resistance to a 20 per cent sodium-chloride solution, though hafnium is the least resistant. In its resistance to 50 per cent sodium hydroxide hafnium is superior to titanium, but inferior to zirconium. These properties indicate that hafnium has promising characteristics for use in corrosive environments, though only in specialized applications, since the metal will probably be available only in limited quantities.

Hafnium can be hot-worked in air at 1650° F. without protection, and it should be possible to hot-forge the metal by procedures which are similar to those employed with zirconium : that is, by using only light blows of the hammer in order to prevent cracking. Though hafnium is harder and more difficult to work than zirconium, cold-working to a maximum reduction of 30 per cent between anneals is possible.

THE CRYSTAL STRUCTURE

The crystal structure of hafnium is similar to that of magnesium. The workability of hafnium can be improved by raising the temperature to 400° F. In machining, tooling similar to that used for machining 18 : 8 stainless steel is satisfactory. The crystal structure of hafnium changes at 2400° F. from hexagonal close-packed (the room-temperature modification) to body-centred cubic. This transformation is similar to that which occurs in zirconium at 1580° F. and in titanium at 1625° F. The room-temperature modification of hafnium is therefore stable at much higher temperatures than that of zirconium and titanium.

Cold-worked hafnium can be completely recrystallized by heating to 1435° F. Annealing should be carried out at about 1550° F. Annealing operations on heavy sections can be carried out in air ; for very light sections, annealing in a protective atmosphere is preferable.

Degreasing can be done in conventional equipment. Scale resulting from annealing in air can be removed by sand blasting or sodium-hydride descaling. Then the material can be dipped into a nitric-hydrofluoric solution if a bright finish is desired. A similar solution can be used to remove slight surface discoloration.

Hafnium can be joined by arc or flash-butt procedures in inert atmospheres, but the weld area must be completely shielded if ductile welds are to be produced.

Up to the present time no commercial applications have been developed for hafnium, except in the atomic energy programme. The metal has been suggested for use in electronic tubes. Alloys of hafnium, containing copper, silver, and nickel, have been produced by powder metallurgy.

THE PALEY REPORT

The Paley Report points out that hafnium is scarce theoretically and practically, and few had seen the relatively pure metal until the separation from zirconium became a semi-commercial operation. It is still very scarce, although some 350 tons per year accompanies the zirconium metal, oxide, and other compounds that are currently used in the United States. The average zirconium ores contain hafnium to about 1.7 per cent of the zirconium content.

There are no ores in which hafnium is the major element and in its present state the metal remains a byproduct in zirconium processing, and because of this factor, and because zirconium reserves are considerable, hafnium resources are considered as substantial.

A New Design of Wagon Tippler

A new wagon tippler designed to Railway Clearing House standards has just been completed by the Fraser and Chalmers Engineering Works of the General Electric Company. Fully automatic in tipping operation, the machine is designed to handle wagons up to the standard Ministry of Transport pattern of 24½ tons capacity, but will deal with smaller wagons down to 8 tons capacity. No clamping or binding mechanism is necessary, and consequently the time cycle of operation is decreased by obviating the necessity to clamp the wagon as a separate operation. A further refinement is the provision of an adjustable side bolster beam for which a patent has been applied.

It should be noted that the present Railway regulations give two heights for the side bolster beam, dependent upon the range of wagons being handled. The difference between these two heights is 1 ft. and this is the range of movement of the adjustable side bolster beam, a feature which enables the full range of wagons from 6 ft. 6 in. to 10 ft. 6 in. high above rail level, to be handled in one machine.

THE COMPONENTS OF THE UNIT

There are five main parts of the tippler: A rail frame forming a cradle on which the wagon is placed; a pair of lifting arms with rope cams attached braced together in vertical and horizontal planes by built-up lattice girders forming the cradle arms; a heavy horizontal double beam member, upon which are mounted the rubber covered self aligning side bolster cushions where the side of the wagon rests during the tipping operation, the assembly being movable vertically to allow for various heights of wagons, and spill plates are so designed that wagon contents regardless of the wagon-height are discharged without spillage; a pair of rolling arms pivoted on the pins between the cradle and rolling arms are connected by a girder attached to which are the top bolster cushions which secure the top of the wagon being tipped; and a hoisting winch arranged for mounting in a pit below ground level at the side of the cradle.

The cradle rests upon solid foundations in its normal position so that the tippler and ropes are not stressed by through traffic, and is pivoted to the cradle arms so that a natural tilt brings the wagon against the side bolster cushions during the early part of the operating cycle. This tilting tendency is controlled by two cam faces. The side bolster cushions are pivoted and so arranged that they are aligned automatically to the side of the wagon thus allowing for wagons of varying widths and angle of side.

Between the two rolling arms is the top bolster supporting girder, and there is no positive connection between cradle arms and the foundation so that the cradle arm girders are free to rise as the rolling arms roll forward. To reduce the amount of work necessary on the actual tippler structure during tipping, a measure of counter balancing is provided.

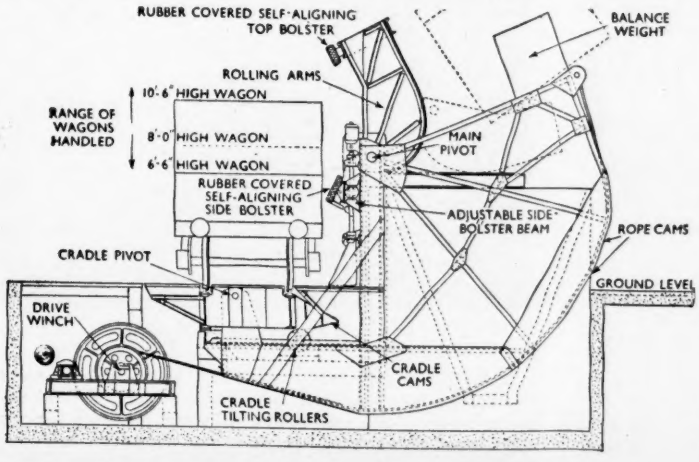
The tippler will handle wagons of the following sizes: Height from top of rail to top of wagon, 6 ft. 6in. to 10 ft. 6 in.; width of body outside, 7 ft. 6 in. to 8 ft. 8 in.; length over headstocks, 15 ft. to 21 ft. 6 in.; wheel base, 8 ft. 6 in. to 13 ft. The tippler will also accommodate all normal hopper wagons.

The hoisting gear is electrically driven by a suitable motor. The two drums are geared to the motor by means of a worm reduction gear and trains of machine cut spur gears. The motor is under push-button control for hoisting and lowering, and to prevent over-winding the tippler when a fully tipped position is reached, an automatic cut-out is provided.

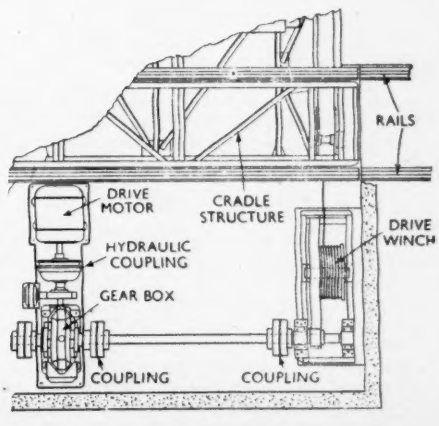
OPERATION OF THE TIPPLER

To operate the tippler a loaded wagon to be discharged is run on to the cradle and the brakes applied. Whilst this is being done the height of the side bolster beam is, if necessary, adjusted by selecting the appropriate push button, the correct position being determined by the height of the wagon. The electric hoisting gear is then put into action. The cradle arms start to rise, and the cradle with the wagon is gradually inclined towards the hopper, the action being controlled by the cradle pivots and cradle cams working on the cradle tilting rollers supported on the foundations. This preliminary action is concluded when the side of the wagon comes into contact with the side bolster cushions.

The hoisting being continued, the wagon cradle and cradle arms form one unit and revolve about the trunnion pins until the top of the wagon meets the top bolster cushions attached to the top bolster girder, and this now forms the final unit which on continuing to hoist revolves and rolls along the rolling path until the load is fully discharged. The hoisting gear is then reversed, the wagon brought back to the original position ready for removal and replacement by a further loaded wagon.



End elevation showing arrangement of the rolling paths, drive gear and adjustable bolster mechanism



Section of the plan view with motor, coupling and gear box in pit

MACHINERY AND EQUIPMENT

Earth Moving Equipment at the B.I.F.

The display of Blackwood Hodge on Outdoor Stand 1305/1204 at Castle Bromwich will exhibit earth moving equipment that is now built in Great Britain and is available for sterling. The display will include the Carlisle Grader with ancillary equipment, Euclid units and Carlisle angledozing equipment. The highlight of the exhibits will be the first public appearance of the Euclid bottom dump wagon, now in production in Great Britain.

The Euclid bottom dump wagon

The Euclid bottom dump wagon, models B7FDT and BIW have a payload capacity of 40,000 lb. and are equipped with a Leyland 11.1 litre, 154 h.p. engine and five speed gearbox. The Leyland engine gives 154 h.p. at 2,000 r.p.m. and has a torque of 450 ft. lb. at 1,100 r.p.m. The coefficient of friction is 0.6 with tyres to ground and rolling resistance is 40 lb. per ton. Mechanical efficiency (engine to ground) is 85 per cent.

The front axle of the unit is an Elliot forged "I" beam with stub axle diameter of $2\frac{7}{8}$ in. at inner bearing and $2\frac{1}{4}$ in. at outer bearing. Dimensions at the centre section are height $4\frac{1}{8}$ in., flange width $3\frac{1}{2}$ in., flange thickness $\frac{1}{4}$ in., and web thickness $\frac{5}{8}$ in. The drive axle is the Euclid heavy duty type with full floating double reduction drive.

The braking system is provided by air pressure operated service brakes fitted on the rear wheels of tractor and trailer. The tractor has cast steel wheels of tyre size 14:00 by 24-14 ply and a rim size of 8.37 v.

The trailer consists of drawbar, hopper, centre partition, axle brackets, doors and door operating mechanism. The drawbar is of two fabricated "I" beams welded to the King Pin bearing and reinforced hopper sides, and the hopper is of Euclid type of 13 cu. yd. capacity struck and 15.1 cu. yd. heaped.

Tractor weight is 18,500 lb. and trailer weight 17,300 lb., giving a net weight unloaded of 35,800 lb. Payload is 40,000 lb. and gross weight of equipment with payload is 75,800 lb.

An Improved Type of Pebble Stove

An improved stationary-bed type of pebble stove, used to preheat air before blowing it into an experimental blast furnace, at temperatures reaching 2,300° F., is described in a U.S. Bureau of Mines report released on March 30. The improved stove is one of the most direct and economical devices for reaching such high temperatures rapidly and without damaging retort walls. The report points out the model which was designed and built by the Bureau, involves an automatic reversing of the air stream by thermal control. The stove was designed for recovering manganese from open-hearth slag.

The pebble stove consists of a chamber lined with mullite brick and filled with pure alumina pebbles about 1 in. in diameter which acts as the heat-exchange medium. As pebbles disintegrate, new ones can be added during the operation—thus increasing heat efficiency. The report states 500 cu. ft. of air per minute is heated in this fashion before being blown into the experimental blast furnace. This type of operation with the pebble stove has never been used with a full-scale blast furnace.

The refractories used, alumina pebbles, are largely responsible for providing the higher temperature service. The general practice of ordinary stoves is to give a heated air of 1,000° to 1,600° F. to the blast furnace. Moreover, the Bureau's heater has been designed to give the desired rate of air flow.

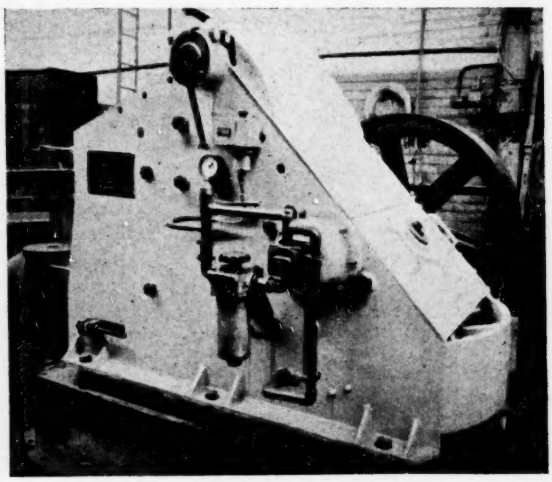
A free copy of Report of Investigations 4949, *Pebble Stoves for Heating Gases to High Temperatures*, can be obtained from the Bureau of Mines, Publications Distribution Section, 4800 Forbes Street, Pittsburgh 13, Pa.

A Display of Equipment for Heavy Industry

The products to be shown on Stand D235/136 at the British Industries Fair, Castle Bromwich, will demonstrate the manufacturing capabilities of Sir W. G. Armstrong Whitworth and Co. (Ironfounders) Ltd. and Jarrow Metal Industries. The whole embraces a cross section of equipment for heavy industry.

The Closeloy rolls to be shown will include a pair of 10.15 in. by 12.5 in. chilled iron units and another exhibit will be a Closeloy P.M. roll mounted vertically, displaying three stages of its manufacture; one section of the roll being left as cast, another rough machined, and a third finished.

An innovation of importance to the mining and quarrying industries was the introduction by Sir W. G. Armstrong Whitworth and Co. (Ironfounders) Ltd. into this country of the Kue-Ken crusher, an American design. This equipment will be on display at the companies' stand. It was fully described in the *Mining Journal* of January 23, 1953. The objective of the Kue-Ken crushing principle is to crush by pressure and thus avoid rubbing or abrasion, and the 19 crushers in the range grade from the model 22 to the 110S. The model 56 depicted in the accompanying illustration has a feed opening of 24 in. by 12 in., a usual speed of 365 to 400 r.p.m., and a maximum indicated crushing capacity of 50 tons per hr. at 3 in. jaw dimension.



The model 56 Kue-Ken jaw crusher

A further exhibit on the stand will be the Beier infinitely variable gear for stepless speed reduction. This gear embodies the principle of the transmission of torque through the drag force in a thin film of oil interposed between driving and driven members.

A steel casting by Jarrow Metal Industries will complete the exhibit.

METALS, MINERALS AND ALLOYS

COPPER.—The indications of a somewhat lower price in copper continue despite the market view that it appeared to be stabilizing around 30 c. in New York. African copper for late May arrival has been offered at 29½ c. c.i.f. New York and the Ministry of Materials has failed to sell the whole of its toll copper which it had offered, and it is expected to reship the balance to the U.K. Katanga copper found no purchasers at 32 c., and it is not evident yet how much was disposed of at its subsequent price of 30 c. Some forward (July/August) foreign copper is reported to have been offered down to 27½ c. There is a great plethora of scrap and customs smelters have sold down to 30 c. delivered with extensive offers of June/July metal at 29 c. Business with consumers generally is done on the basis of price on day of shipment so that the above figures are only strictly applicable for immediate purchase. In some quarters 28 c. seems to be expected by the summer.

The Rhodesian copper producers have, as was expected, accepted the Ministry of Materials proposal to reduce notice to terminate existing bulk purchase agreements to three months. The present U.K. buying price is £268 per ton and the selling price £280. Formal notice to terminate is not expected till early next month. There is no improvement in the coal situation on the copperbelt mines and the Mufulira smelter is expected to reduce output by 50 per cent, which corresponds with the reduction in mining operations earlier, while refinery operations were down to two-thirds. At the other mines the situation has not further worsened. Chile is believed to be disposing of fair quantities of metal at its own price—36½ c. delivered Valley Points. The purchasers are reported to be Anaconda and Kennecott of which the American companies producing in Chile are subsidiaries. In Australia the price of copper has been reduced by £A20 to £A330 per ton.

Recent reports on the Bor copper mine in Yugoslavia are to the effect that there are remaining reserves of some 70,000,000 tonnes of ore, but they are of much lower grade being put at 1.24 per cent Cu against 5.04. It is planned to improve the recovery of by-products estimated to yield 50,000 tons of copper and there are 350,000 tons of slag to be considered.

LEAD.—Lead has further declined since our last with spot down to £73¼ and forward to £71⅛ per ton on Wednesday. At the beginning of the week the New York price was cut by 12 c. by the A.S. and R. In Australia, where last year's output was 159,616 tons against 165,758 in 1951, price controls have been lifted, not only for lead but for zinc and tin. The American Metal Company has announced its opposition to various Bills recently introduced into Congress for a sliding scale of higher duties on imports of lead and zinc. They estimate that not only would the increases demanded increase the consumers' costs by some $200,000,000 a year, but would encourage increased use of substitute materials.

At the recent meeting of the Lead Industries Association in New York, Mr. J. A. Costello, vice-president of Ethyl Corporation, claimed that there was sufficient potential lead productive capacity to meet any reasonable increase in demand, but such increase in consumption was dependent on the continued unrestricted supply of foreign lead. Mr. Costello declared that tetra-ethyl lead was now the second biggest consumer of the metal, and that the economic value of such "dope" far outweighed the resource value of the lead which its manufacture entailed. Incidentally, he declared that a 25-year forecast for demand such as had been made in the Paley Report was impossible with any degree of accuracy.

The Sté. des Mines de Sidi Kaber has received a credit of Frs.238,000,000 from D.M.P.A. to be paid for in concentrates delivered to the Agency.

TIN.—Great daily fluctuations continue to occur in the tin market, and cash tin fell below the £700 mark for the first time since July 1950 on Wednesday. Grade A metal was quoted 94 c. in New York. Cynics there are asking, "Where is Mr. Symington's 'Tin Castel' now?"

Conferences have been arranged in Malaya between the Government and the producers to consider what can be done to meet the heavy fall in prices. No information so far is available as to what steps to meet this problem of oversupply will be attempted; the chief hope seems to be that the price will recover. One estimate is that marginal producers, that is more particularly small mines and low-grade opencast and gravel pump propositions, will be unable to operate at a profit with prices below $400 per pikul. Under the circumstances the reduction of taxation and royalty is seen by producers as the most helpful prospect.

ZINC.—The New York price has been maintained at 11 c. E. St. Louis, as sellers are resisting price cutting in view of the relatively high cost of domestic production and the expectation that the prospect of further reduction would only accentuate market weakness. On the Metal Exchange prices have again declined and on Wednesday were prompt £63¼ and three months £63⅛ per ton.

ALUMINIUM.—Reviewing the outlook for aluminium, the President of Reynolds Metals Company recently forecasted a maintenance of a strong market for the rest of the year, estimating that any drop in military consumption would be met prompty by civilian demand. Output in the first quarter of the year was 27 per cent better than in the same quarter of 1952. The U.S. Government Small Defence Plant Administration have applied to the Treasury for a temporary suspension of import duties on basic aluminium. Suspension, however, would require Congress approval.

The strike of aluminium workers at the plant of the Alumina Jamaica Company at Shooters Hill, near Kingston, ended on April 16 and work was to be resumed last Wednesday. The strike had completely tied up Alcan's refining plant.

ANTIMONY.—Antimony, like the rest of the metals, is reflecting the general recession in prices. In New York the price of ore has been reduced from $2.70/2.80 per s.ton unit to $2.40/2.50.

ASBESTOS.—The Philadelphia paper *Asbestos* reports the general market situation substantially unchanged. The raw material market is running fairly steadily at about 15-20 per cent below what is normal for the time of year. Some foreign shipments are held up in the hope of lower transportation costs.

MAGNESIUM.—Three of the U.S. Government's six magnesium plants are expected to close by mid-summer, as it is believed that the Government has now practically filled its magnesium stockpiling programme. Government installations are said to turn out about 80 per cent of the country's production. The remaining Government plants and private production should be able to fill industrial demands.

NICKEL.—The Freeport Sulphur Company, which controls the Nicaro Nickel Company in Cuba, has given particulars of extensive exploration work carried out at Moa Bay in the east of the island which has yielded highly important results. This discovery, which is situated about 40 miles west of the Nicaro mine, is believed by Freeport to be the largest deposit anywhere in the Free World, outside Canada. A minimum of 40,000,000 tons of ore is said to be indicated averaging around 1.35 per cent nickel and .14 per cent cobalt. A new leaching process is said to have been devised with the co-operation of Chemical Construction Company, a subsidiary of American Cyanamid. A smelter is to be built, but until a pilot plant has been operated the site will not be decided on. The present estimate is for a minimum output of 15,000 s.tons of nickel and 1,500 tons cobalt.

With consumption growing and imports declining, stocks in the U.S. at the end of January were reported as 6,333 s.tons compared with 6,969 s.tons at the end of December.

TUNGSTEN.—Nothing further has developed in the wolfram market this week. It is reported in Portugal that the Ministry of Materials, besides having ceased to buy, is not issuing import permits to private industry. However, a certain demand is being experienced for high-grade scheelite for the U.S.A. Tungsten powder and ferro have been reduced in the U.S. by 50 c. per lb. to $5.35 per lb. but no change has been announced in the home price.

Iron and Steel

Supplies of iron and steel are now improving so rapidly that Sir Lincoln Evans, the general secretary of the Iron and Steel Trades Confederation, forecasts "a world surplus" before the end of the year. Rising production already enables the industry to satisfy most normal demands, and steel plate is the one outstanding exception. This problem has been engaging the serious attention of the Minister of Supply who has evolved a new voluntary scheme to improve the distribution of steel plate to ship builders and other important users.

There will be an Inter-Departmental Committee whose task it will be to keep under review the needs of plate using industries and to consider any adjustments in the pattern of production and deliveries which may be desirable. Mr. Robert Marshall, a director of Colvilles and a member of the Iron and Steel Corporation, will act as technical adviser to the committee and the steel industry has appointed a group of plate makers to collaborate with the committee and to act as a clearing house for consumers' requirements.

As a supplement to home supplies, the British Iron and Steel Corporation has purchased 10,000 tons of steel plate from Austria, and home production which, a year ago, was running at the rate of 40,000 tons a week, has been stepped up to a weekly average of 47,000 tons. Further increases are planned which will raise production to about 2,500,000 tons per annum and as a long term measure the Minister has approved a scheme submitted by the South Durham Steel and Iron Company for the extension and modernization of a plate mill on the North-East Coast which will produce an extra 100,000 tons a year, but this will not mature until 1956.

The trade interpretation of these special plans for the plate trade, is that the termination of the general steel allocation system is imminent.

The London Metal Market

(From Our Metal Exchange Correspondent)

The first tentative step towards the re-opening of dealings in copper on the London Metal Exchange has taken place with the producers' agreement to reduce the period of notice for the cessation of bulk buying to three months: the next step will be the actual giving of notice, which many expect before the end of this month. With foreign copper being offered in New York at under 30 c. per lb., it is hoped that the end of the week will see an announcement of a substantial reduction in the U.K. domestic price.

The tin market has continued very active, but the price level has settled at around the £700 per ton mark with reports of a little better consumer demand. The backwardation has been kept down by the increase in stocks in official warehouses, and it is expected that this trend will continue as it seems probable that more tin will be delivered in London resulting from the almost complete cessation of buying which has taken place in America since the beginning of the month. The Eastern price on Thursday morning was equivalent to £707⅛ per ton c.i.f. Europe.

The prices of both lead and zinc have receded again, but turnovers have fallen and there are indications that a further major recession is now unlikely. Consumer demand has been a little better especially in America, and there are reports that in the case of zinc certain productions have stopped. The fall in the lead price resulted in a further reduction in the U.S. price to 12 c. per lb. to prevent a flood of imports.

Closing prices and turnovers for the week are given in the following table:—

	April 16		April 23	
	Buyers	*Sellers*	*Buyers*	*Sellers*
Tin				
Cash	£730	£735	£695	£700
Three months	£720	£725	£682½	£685
Settlement	£730		£695	
Week's turnover	1,480 tons		595 tons	
Lead				
Current month	£81	£81¼	£73¾	£74
Three months	£78½	£78¾	£72½	£72⅞
Week's turnover	6,375 tons		5,500 tons	
Zinc				
Current month	£70½	£70¾	£63½	£63¾
Three months	£71⅛	£71⅜	£64	£64¼
Week's turnover	5,050 tons		5,550 tons	

U.K. METAL & MINERAL IMPORTS—FEBRUARY 1953

	Units	*February 1953*	*Jan.-Feb. 1952*	*Jan.-Feb. 1953*	*Increase or decrease in 1953 over 1952*
Non-ferrous metals and manufactures:					
Aluminium and alloys	Cwt.	357,377	560,291	511,049	— 49,242
Bismuth*	Lb.	25,651	59,133	36,665	— 23,468
Cadmium**	Lb.	38,546	280,336	87,819	—192,517
Cobalt and Alloys**	Lb.	417,900	463,622	715,504	+351,882
Copper Electrolytic	Cwt.	482,072	681,780	795,932	+114,252
,, Other	Cwt.	173,683	438,660	466,677	+ 28,017
Lead	Cwt.	67,894	960,520	505,185	—455,335
Mercury	Lb.	107,325	107,495	235,791	+128,296
Nickel	Cwt.	14,941	23,837	25,712	+ 1,875
Tin	Cwt.	7,107	28,900	8,442	— 20,458
Zinc	Cwt.	377,851	663,560	741,869	+ 78,309
Ores and Concentrates:					
Antimony ore and conc.	Tons	1,345	3,598	1,345	— 2,253
Bauxite	Tons	30,685	53,995	58,269	+ 4,274
Chromium ore	Tons	15,968	30,232	25,482	— 4,750
Iron pyrites†	Tons	13,504	39,879	46,236	+ 6,357
Manganese ore	Tons	25,477	82,251	87,369	+ 5,118
Molybdenum ore	Cwt.	31	10,252	7,000	— 3,252
Nickel ore conc. & matte	Tons	3,774	3,592	6,010	+ 2,418
Tin ore and conc.	Tons	735	7,693	2,333	— 5,360
Titanium: ilmenite	Tons	11,100	14,209	15,282	+ 1,073
,, other sorts	Tons	278	2,238	953	— 1,285
Tungsten ore	Tons	780	304	1,403	+ 1,099
Zinc ore and conc.	Tons	16,964	31,880	52,730	+ 20,850
Non-metalliferous mining products:					
Asbestos	Tons	6,437	15,694	13,840	— 1,854
Magnesite	Tons	934	5,371	1,886	— 3,485
Sulphur	Tons	9,134	83,779	33,347	— 50,432

*Excluding bismuth alloys. †Including cupreous iron pyrites.
**The figures for 1953 are not completely comparable with those for previous years.

APRIL 23 PRICES

COPPER

Electrolytic .. .. £280 0 0 d/d

TIN, LEAD AND ZINC

(See our London Metal Exchange report for Thursday's prices)

ANTIMONY

English (99%) delivered, 10 cwt. and over .. .. £225 per ton
Crude (70%) .. .. .. £210 per ton
Ore (60% basis) .. .. .. 20s. — 22s. nom. per unit, c.i.f.

NICKEL

99.5% (home trade) .. .. £483 per ton

OTHER METALS

Aluminium, £161 per ton
Bismuth (min. 4 cwt. lots) 17s. lb.
Cadmium (Empire), 14s. 4d. lb.
Chromium, 6s. 5d./7s. 6d. lb.
Cobalt, 20s. lb.
Gold, 248s. f.oz.
Iridium, £60 oz. nom.
Magnesium, 2s. 10½d. lb.
Manganese Metal (96%-98%) £280/£295
Osmiridium, £40 oz. nom.
Osmium, £65/70 oz. nom.
Palladium, £7 15s./£8 10s. oz.
Platinum, £27/£33 5s.
Rhodium, £42 10s. oz.
Ruthenium, £25 oz.
Quicksilver, £70 10s./£71 ex-warehouse
Selenium, 30s. 6d. nom. per lb.
Silver 74d. f.oz. spot and f'd.
Tellurium, 15s./16s. lb.

ORES, ALLOYS, ETC.

Bismuth .. .. 65% 9s. lb. c.i.f.
60% 8s. 9d. lb. c.i.f.
Chrome Ore—
Rhodesian Metallurgical (lumpy) £14 18s. per ton c.i.f.
,, ,, (concentrates) £14 18s. per ton c.i.f.
,, ,, Refractory £14 10s. per ton c.i.f.
Baluchistan Metallurgical .. £16 11s. 6d. per ton c.i.f.
Magnesite, ground calcined .. £26 - £27 d/d
Magnesite, Raw .. .. .. £10 - £11 d/d
Molybdenite (85% basis) .. 103s. 10½d. per unit c.i.f.
Wolfram (65%) .. .. .. World buying 310s. - 320s.
,, ,, ... 352s. 6d. Selling
Scheelite .. .. World buying 290s. - 300s.
,, ... 342s. 6d. Selling
Tungsten Metal Powder (for steel manufacture) .. .. 30s. 8d. nom. per lb. (home)
Ferro-tungsten .. .. .. 25/3-25/9 nom. per lb. (home)
Carbide, 4-cwt. lots .. .. £35 13s. 9d. d/d per ton
Ferro-manganese, home .. .. £49 15s. 0d. per ton
Manganese Ore U.K. (48%-50%) .. .. .. 6s. 1d. per unit
Brass Wire .. .. 2s. 7½d. per lb. basis
Brass Tubes, solid drawn .. 2s. 1½d. per lb. basis

THE MINING MARKETS

(By Our Stock Exchange Correspondent)

The gilt-edged market held up well. After initial strength there was naturally a setback on the news that the British Electricity Authority is to float a 4½ per cent loan for £125,000,000, but prices hardened again on Wednesday. This resilience is most encouraging.

Kaffirs dropped following the results of the South African election but later recovered much lost ground. Investors were clearly relieved that uncertainty was ended, and in the past the Nationalist administration has certainly not been hostile to the gold mining industry. Interest was again mainly centred on uranium issues. Optimistic forecasts were made concerning the coming West Rand Consolidated quarterly figures, but the principal rise was in Randfontein. East Champ d'Or also rose. Daggafontein have started uranium production and the news was reflected by a gain in price by this mine and by East Daggafontein. Western Reefs hope to start uranium production in the third quarter of the year; there have been delays in the delivery of plant. The Ellaton mine has been named as a future uranium producer together with three smaller projects on the Far West Rand. This is particularly important as the mine is expected to be a low cost producer. East Rand Extensions and Strathmore Exploration are the chief shareholders in this venture, followed by Anglo American Corporation and Anglo-Transvaal Consolidated. Strathmore is also interested in the other three concerns. Market interest was focused on developments from the shaft on the Western Reef and Vaal Reef boundaries. The Vaal Reef here is expected to be a uranium producer and considerable interest in the shares was evinced at around 17s. 3d.

In the O.F.S., the Merriespruit drilling results caused a sharp rise in the price of the shares. Values in borehole KA2 ranged up to 982 in.-dwt. Good development news from President Steyn attracted interest to both the President mines. Despite enthusiastic rumours concerning possible developments in the Freddies mines, the shares eased in anticipation of difficult contango facilities for the end of the account on Tuesday.

The probable benefits of the new taxation concessions failed to help West African shares. Ashantis led the decline with a fall of 1s. 6d. Kwahu were marked down to 3s. 9d. on news that the offer to purchase the Mount Elliot mine in Queensland on a share for share basis had been accepted.

Small declines in Western Australian shares were general. The local government is starting a drilling programme which, it is hoped, will attract mines to develop any promising deposits encountered. The expenses of the programme will be borne by the government and costs only recovered from interested parties.

In the miscellaneous section, the proposal to liquidate the Sherwood Starr mine was defeated and a change in the board and management has taken place. The shares were marked down to 4s. following the meeting.

Coppers were somewhat steadier, although prices were generally rather lower in anticipation of a reduction in the metal price. The existing price contract comes to an end on April 24 and it is expected that the government will then make a substantial cut in the selling price to consumers. Agreement has been reached between the Ministry and the Rhodesian producers to cut the period of notice for termination of bulk trading arrangements from six to three months. It is expected that the Ministry will give this notice early in May and that dealings in copper on the London Metal Exchange may start some time in August. Market circles are guessing a drop of anything up to £70 a ton in the metal price, but this must remain purely speculation. The output of Mufulira's smelter is expected to be reduced by 50 per cent due to the coal shortage. Mining operations were halved some time ago and the refinery is at present working at two-thirds capacity.

Tin shares, after a weak start, hardened a little on demand from Singapore and on the steadier metal price towards the end of the week. Geevor, the Cornish producer, fell sharply. Nervousness existed over the operating costs as set against the lower metal price.

Lead/zinc shares also came back on the lower metal prices.

	Price	+ or —		Price	+ or —		Price	+ or —		Price	+ or —
FINANCE	*April 22*	*on week*	**O.F.S.**	*April 22*	*on week*	**MISCELLANEOUS GOLD (contd.)**	*April 22*	*on week*	**TIN (Nigerian and Miscellaneous contd.)**	*April 22*	*on week*
African & European	2/15	+1/2	Freddies	14/9	—7½d	St. John d'El Rey	28/-	—1½d	Geevor Tin	9/6	—1/1½
Anglo American Corpn.	6¼		Freddies N.	14/1½	—7½d	Zams	26/10½	—1/10½	Gold & Base Metal	3/9	—3d
Anglo-French	18/3	—6d	Freddies S.	14/-	—7½d				Jantar Nigeria	12/3	—3d
Anglo Transvaal Consol.	26/3		F. S. Geduld	3 15/16		**DIAMONDS & PLATINUM**			Jos Tin Area	12/9	—3d
Central Mining (£1 shrs.)	33/1½	—7½d	Geoffries	18/3	—9d	Anglo American Inv.	4 1/16	—1/16	Kaduna Prospectors	3/-	
Consolidated Goldfields	49/-		Harmony	27/6	+6d	Casts	22/9	+9d	Kaduna Syndicate	2/6	—6d
Consol. Mines Selection	25/7½	+7½d	Loraine	10/-	—3d	Cons. Diam. of S.W.A.	4⅛		London Tin	5/-	
East Rand Consols	3/10½	+1½d	Lydenburg Estates	14/-		De Beers Defd. Bearer	62/-	—1/6	United Tin	2/6	
General Mining	4 1/16	—1/16	Merriespruit	7/9	+1/4½	De Beers Pfd. Bearer	14½	+⅛			
H.E. Prop.	41/3		Middle Wits	18/9	+6d	Pots Platinum	8/-	—1½d	**SILVER, LEAD, ZINC**		
Henderson's Transvaal	7/6	—6d	Ofsits	40/7½	—7½d	Watervaal	14/-XD	—6d	Broken Hill South	41/3	
Johnnies	64/3	—1/-	President Brand	24/4½	+4½d				Burma Mines	1/9	—1½d
Rand Mines	3⅜	—⅛	President Steyn	25/4½	+3d	**COPPER**			Consol. Zinc	25/6	+3d
Rand Selection	33/1½	—1/10½	St. Helena	14/-	—6d	Chartered	52/-	—3d	Lake George	9/9	—9d
Strathmore Consol.	41/3	—2/3	Virginia Ord.	14/6	+4½d	Esperanza	4/-	—1½d	Mount Isa	32/6	—1/3
Union Corp. (2/6 units)	29/-	—1/9	Welkom	22/3	—1½d	Indian Copper	4/6	+3d	New Broken Hill	18/-	—9d
Vereeniging Estates	4 1/16	+1/16	Western Holdings	3 1/16	+⅛	Messina	3 5/16 XD	—⅛	North Broken Hill	50/-	—1/3
Writs	35/-					Nchanga	5 1/2	—⅛	Rhodesian Broken Hill	10/3	—4½d
West Wits	46/3		**WEST AFRICAN GOLD**			Rhod. Anglo-American	45/9	—3d	San Francisco Mines	23/6	+4½d
RAND GOLD			Amalgamated Banket	1/7½XD		Rhod. Katanga	8/7½	—4½d	Uruwira	3/6	
Blyvoors	43/3		Ariston	6/7½	—1½d	Rhodesian Selection	13/7½	—4½d			
Brakpan	12/-	—7½d	Ashanti	23/6	—1/6	Rhokana	16⅛	+⅛	**MISCELLANEOUS BASE METALS & COAL**		
City Deep	23/9	—7½d	Bibiani	6/1½	—3d	Rio Tinto	21½		Amal. Collieries of S.A.	45/6	
Consol. Main Reef	26/3	—7½d	Bremang	2/4½		Roan Antelope	12/6	—6d	Associated Manganese	41/6	—2/-
Crown	35/-	—1/10½	G.C. Main Reef	3/9		Selection Trust	33/-	—9d	Cape Asbestos	21/10½	+7½d
Daggas	3⅛	+⅛	G.C. Selection Trust	7/-		Tanks	54/9	—2/1½	C.P. Manganese	55/6	+1/-
Doornfontein	26/9		Konongo	3/1½	—1½d	Tharsis Sulphur Br.	48/9	+1/3	Consol. Murchison	26/3	—6d
Durban Deep	45/-	—1/10½	Lyndhurst Deep	1/4½					Mashaba	6d	
E. Daggas	18/9	+3d	Marlu	1/1½		**TIN (Eastern)**			Natal Navigation	3 1/2	
E. Geduld (4/- units)	36/10½	—7½d	Taquah & Abosso	3/6	—3d	Ayer Hitam	21/3		Rhod. Monteleo	9/6	
E. Rand Props	3 1/16	—1/16				Bangrin	6/-		Turner & Newall	52/-	—9d
Geduld	4 1/16	—1/16	**AUSTRALIAN GOLD**			Gopeng	8/6	—1½d	Wankie	14/-	
Govt. Areas	13/9		Boulder Perseverance	2/1½	—1½d	Hongkong	7/6		Witbank Colliery	3 1/16	
Grootvlei	24/6	—9d	Gold Mines of Kalgoorlie	10/7½	—1½d	Ipoh	13/9	—1/3			
Libanon	13/-	—1½d	Great Boulder Prop.	7/3	—3d	Kamunting	8/7½	—4½d	**CANADIAN MINES**		
Luipaards Vlei	27/6	—3d	Lake View and Star	15/-XD	—3d	Kepong Dredging	5/-		Dome	$36½	—1
Marievale	21/6		Mount Morgan	17/9	—3d	Kinta Tin Mines	10/7½	+1½d	Hollinger	$25	—1
Modderfontein East	18/9		North Kalgurli	11/10½	—1½d	Malayan Dredging	24/3	+3d	Hudson Bay Mining	$88	—6½
New Kleinfontein	25/-		Sons of Gwalia	6/6		Pahang	13/6XD	—1/-	International Nickel	$71¾	—1¼
New Pioneer	25/-	—9d	South Kalgurli	7/9	+3d	Pengkalen	7/6		Mining Corpn. of Canada	£4½	—1/-
Randfontein	46/9	+1/9	Western Mining	11/6	—6d	Petaling	10/3	+4½d	Noranda	$126	—7
Robinson Deep	10/-	—6d				Rambutan	11/9		Quemont	£6½	+⅛
Rose Deep	15/-	—7½d				Siamese Tin	17/3	—6d	Yukon	4/-	—1½d
Simmer & Jack	5/6	—1½d	**MISCELLANEOUS GOLD**			Southern Kinta	13/4½	+4½d			
S.A. Lands	28/1½	—7½d	Cam and Motor	9/6	+3d	S. Malayan	23/-	—6d	**OIL**		
Springs	6/-	—4½d	Champion Reef	5/-		S. Tronoh	10/-	—3d	Anglo-Iranian	5¼	+1/2
Stilfontein	29/6		Falcon Mines	7/4½		Sungei Kinta	15/-		Apex	41/6	—1/-
Sub Nigel	2½	—1/2	Globe & Phoenix	25/9		Tekka Taiping	5/9		Attock	27/6	
Van Dyk	10/-	—6d	G.F. Rhodesian	5/10½	+3d	Tronoh	21/3	+7½d	Burmah	45/-	
Venterspost	16/6	—3d	London & Rhodesian	4/7½					Canadian Eagle	32/3	—9d
Vlakfontein	16/-	—3d	Motapa	2/6		**TIN (Nigerian and Miscellaneous)**			Mexican Eagle	21/-	
Vogelstruisbult	34/6		Mysore	3/-		Amalgamated Tin	9/7½	—4½d	Shell (bearer)	4 1/16	—1/2
West Driefontein	7 1/16	+1/2	Nundydroog	5/9		Beralt Tin	24/-	—7½d	Trinidad Leasehold	26/6	—1/9
W. Rand Consolidated	59/4½	—4½d	Ooregum	3/1½		Bisichi	3/10½	—1½d	T.P.D.	24/9	—6d
Western Reefs	50/-	+3d	Oroville	10/3	—3d	British Tin Inv.	13/6	—3d	Ultramar	22/6	—1/-
						Ex-Lands Nigeria	4/-	—1½d			

COMPANY NEWS AND VIEWS

Union Corporation in New Form

The 1952 Annual Report of the well-entrenched Union Corporation shows that it stood up well against the restricted opportunities for market operations. Its income during the year from dividends and interest increased by £142,453 to £1,848,328, but the realized profit on shareholdings, fees and sundry receipts decreased by £395,898 to £196,926. Hence the Corporation's total income was lower at £2,045,254 compared with £2,298,700. After deducting directors' fees, pensions and taxation—£818,300 against £1,153,000—the net profit was £1,058,145 against £982,714. The dividend absorbed £1,020,000 and the balance forward was £351,686 against £313,541 brought in. The distribution totalled 1s. 4d. per share (53⅓ per cent) free of tax on the 2s. 6d. shares which were split into this denomination from 12s. 6d. last year. It compares with 6s. 6d. (52 per cent) tax free previously paid on the shares before being sub-divided.

The Corporation continues to distinguish itself by its traditional method of giving interesting statistics regarding trade cycles, world gold production and figures of gold holdings of various countries. This is all in addition to informative news of its own stewardship and the working results of the various mines under its control. These include Geduld, East Geduld, Marievale, Grootvlei and Van Dyk on the Rand and St. Helena in the O.F.S. Other ventures include the San Francisco Mines of Mexico, Chrome Mines of Africa, Tsumeb Corporation, Bay Hall Trust, British Enka and S.A. Pulp and Paper. Additionally, interests are held in undertakings, prospecting and exploring districts of the Transvaal, Tanganyika, etc.

Rand Mines Diamond Jubilee Year

In the gold mining industry of the Witwatersrand, the Rand Mines Limited has played an important rôle. It traces its history back to the early days, having been registered in 1893 and this year celebrates its diamond jubilee. The epic story of its record is unfolded in a Special Annual Report for 1952. This recaptures the atmosphere of 60 years ago, brings back memories of the first directors and the old mines which constituted the nucleus of the Company's interests. These have now grown out of all comparison.

The principal investments which constitute the present portfolio—some 31 in number—are much the same as indicated in the previous Report with an increased holding of Harmony Gold. They are for the most part, shareholdings in prominent dividend-payers of the Rand, many scheduled to produce uranium but which last year were forced to scale down their payments. It is not surprising, therefore, that this finds reflection in Rand Mines income for the year. Total received from dividends amounted to £788,233, or £188,304 less than previously. Interest and Exchange increased by £4,546 to £33,606 and sundry revenue by £35,172 to £56,286—a total of £878,125 against £1,026,711. After allowing for administration and other outgoings, the profit was £818,901 compared with £949,513. Taxation called for £39,161 (£44,075), and although it would have been possible to maintain the dividend, prudence decreed a total of 6s. against 7s. in 1951, absorbing £645,298. The balance carried forward is £1,878,008 compared with £1,743,566 brought in.

The market value of quoted investments—the total stands in the balance sheet at £6,015,278 (an increase of £446,776)—largely exceeds the book value. Investment reserve figures at £4,747,003; Exploration Reserve £316,205. Liquid resources amount to £2,857,869 and after allowing £2,005,673 in respect of liabilities, the available net liquid surplus amounts to £852,196.

Lower Profit Trend of Camp Bird

The results of Camp Bird for 1952 were not up to those of the previous year when the company was able to add a jubilee bonus to its dividend. It carries on a mining-finance business and, as is usual in this type of enterprise, revenue stems from several different sources. In the case of Camp Bird from profits on share dealing, from investment income and profits of the operation of its mine in Colorado. This was, at one time, its principal asset; indeed the company was formed over fifty years ago to work it, which it did with very profitable results. But no mine lasts for ever and most of the property is now worked out. A part, however, is let on tribute and it is from this that the company derives benefit by way of royalties; last year it received an amount of £9,378 against £19,492—the reduction coming about from lower base metal prices received by the tributors. A smaller amount was also received by the company from realization of investments—£23,844 against £97,101, but dividends brought in more—£193,994 (£159,794). Expenses were about the same, with the result that the balance profit of £211,607 went against £259,473. Taxation called for more, £112,316 compared with £100,979, and investment reserve £50,000 (£65,000). Dividend of 1s. per share was repeated, absorbing £57,065 and the amount carried forward was £38,636 compared with £46,410 brought in.

City Deep's Shaft Sinking Programme

In consequence of the considerable mining depth of up to 9,000 ft. attained on the City Deep, it was found necesssary to initiate a big shaft-sinking programme. This has been proceeding for two or three years and has been financed out of profits. The question of a change in stoping has now presented itself with a view to minimizing the incidence of pressure bursts.

The company's 1952 annual report gives news with regard to this and also operations which were affected by shortage of labour. A lower tonnage was milled—1,851,000, compared with 1,955,000 tons and although yield was slightly higher, 4.06 dwt., revenue per ton dropped by 9d. to 52s. The most serious feature, however, was the rise of 5s. 4d. per ton milled in costs to 47s. 3d., the highest figure for more than twenty years. City Deep is an old mine; it has been producing since 1911, while the adjoining Nourse, which it absorbed in 1949, had been producing since 1897. In consequence of the increased working costs resulting in a drop of 6s. 1d. in profit per ton, the total working profit last year came down to £437,501 against £1,056,905. This necessitated the dividend being reduced to 2s. 6d. (against 5s. 6d.) absorbing £253,354. Taxation called for a much lower amount—£9,319, against £291,231, and after accounting for all other appropriations, the balance carried forward was £806,370, as against £867,124 brought in.

Three reefs are being worked—the Main Reef, Main Reef Leader and the South Reef which latter continued to add an appreciable tonnage to reserves. Footage accomplished was 4,003 ft. lower at 50,880 and of the 23,700 ft. sampled, 32.4 per cent proved payable, value being 12.5 dwt. Ore reserves are only slightly down by 37,000 tons at 5,397,000, value being 5.7 dwt.

Modderfontein B's Results in 1952

Although Modderfontein B. Gold Mines during 1952 crushed 27,000 tons more than in the preceding year, when 648,000 tons were milled, the yield at 2.2 dwt. per ton was a shade lower so that the total gold recovery of 74,517 oz. showed an increase of only 146 oz. over 1951. Working costs increased 2d. to 25s. 7d. per ton and the working profit per ton milled was reduced by 1s. 11d. to 2s. 10d. These unfavourable influences, together with the decrease in the premium revenue received from gold sold on the free market, brought about a sharp fall in the working profit to £96,080, compared with £154,344 in 1951, a decrease of £58,264. Taxation required £30,287 (£77,742) giving a net profit on the year's operation of £65,793, compared with £76,602. The carry forward at the end of 1952 was £256,453 (£229,512) which was arrived at after transferring £70,000 (same) for reduction of capital and appropriating £6,354 (£4,470) for the forfeited dividends account.

At the annual meeting to be held in Johannesburg on May 12, shareholders will be asked to approve a special resolution reducing the company's authorized capital from £420,000 to £350,000 by returning a further 6d. per share in cash, thereby reducing the nominal of the 2,800,000 shares from 3s. to 2s. 6d. each. Mr. P. H. Anderson is chairman.

Company Shorts

Gold and Base Secure Advance of £250,000 from D.M.P.A.—The announcement by Gold and Base Metal Mines of Nigeria that it has secured an advance of up to £250,000 from D.M.P.A. to be used to develop their columbite producing areas in the Liruien Kano district of Northern Rhodesia (see page 492 of this issue), will be a valuable aid in expediting the company's plans to exploit these deposits by monitors, gravel pumps and sluicing based on an extensive water conservation scheme.

As previously announced in our issue of March 6 last, the company hopes to increase its columbite and tin output from the 26 tons columbite and 570 tons tin achieved in 1952 to 80 tons columbite and 670 tons tin during the current year, rising to 150 tons columbite and 750 tons tin in 1955/56.

Progress to date has been excellent. The monthly quarterly figures reported an output of 15¾ tons columbite and 144 tons tin compared with a mere 3.2 tons columbite and 135 tons in the corresponding period of 1952.

Nor do the March quarter figures represent production derived from the whole of its new areas as they were acquired piecemeal during the period. Moreover, the March and June quarters of the year are in Nigeria's dry season and output is normally at its lowest, the peak period being in the September quarter. Thus the target figure of 80 tons in 1953 may well be surpassed.

The advance from D.M.P.A. carries a stage further this Agency's announcement in May, 1952, that it would pay a 100 per cent bonus on all shipments of columbite reaching the U.S.A. after that date. The purpose of making the price was to enable the U.S. Government to effect a stockpile of columbite of around 7,500 tons by 1956. Current estimates are that the stockpile is about 600 tons which leaves room for approximately 1,725 tons to be absorbed each year.

Since Nigeria produces about 95 per cent of the world output and its total production only amounted to 864 tons in 1950, there must be some doubt that the stockpile goal will be reached by the end of 1956.

In any event, Gold and Base Metals should stand to benefit consederably. The present price of columbite is believed to be in the region of £1,650 (320s. a unit) per ton for short term contracts and the U.S. Government are prepared to pay more than double, 680s. per unit, so that prices received per ton when the company negotiates its next contract with the D.M.P.A. may see the price per ton—depending on the grade—at a figure of somewhere around £3,500.

Four More Uranium Producers.—Stilfontein Gold Mining Company has announced that an extension of its uranium leach plant has been officially approved for the purposes of treating the uranium-bearing slimes to be contributed by four other gold mines in the Klerksdorp district of the Transvaal.

These four mines are the Afrikander Lease, Babrosco Mine (Pty.), Ellaton Gold Mining and New Klerksdorp Gold Estates. The bulk of the capital expenditure involved, estimated at £1,500,000 to cover the cost of the extension of the leach plant, and a sulphuric acid plant, is to be financed by loans from British and American sources. This is the same procedure as followed in previous uranium arrangements and the money will actually be provided free of capital risk through the South African Atomic Energy Board.

The amounts applicable to the individual companies are estimated at £450,000 for Ellaton; £60,000 for New Klerksdorp; £57,000 for Afrikander and £30,000 for Babrosco.

New Klein's Capital Expenditure Programme.—Under this heading in last week's issue it was reported that the company's profit per ton for 1952 was 6s. 7d. compared with 9s. 7d. in 1951. In fact, the profit per ton in 1951 worked out at 9s. 2.6d. Similarly, the total profit figure was given as £428,840 for 1952 compared with £598,576 for 1951. This latter figure should have read £589,576.

Triefus Pay 25 per cent on its Preference Shares.—Triefus and Co., the well known exporters of industrial diamonds, paid a total of 25 per cent on its preferred ordinary shares for the year ended December 31, 1952. Unfortunately, this distribution was given as 15 per cent in our last week's issue.

Morrison, Marshall and Hill have announced that its associated company, Messrs. Marshall-Howlett Ltd. have been appointed London agents of William Currie and Company (Rubber Manufacturers) Ltd., Caledonian Rubber Works, Edinburgh, 11.

Mr. Felix E. Wormser has been recommended by President Eisenhower to the Senate for confirmation as Assistant Secretary of the Interior, for mineral resources.

TRANSVAAL CONSOLIDATED LAND AND EXPLORATION COMPANY, LTD.

(Incorporated in the Union of South Africa)

AUTHORIZED AND ISSUED CAPITAL — £465,119 in 930,238 Shares of 10/- each

The Report and Accounts for the year ended 31st December, 1952, contain, inter alia, the following information :

PROPERTY—The Company's holding of farm property and mineral rights in the Transvaal at the 31st December, 1952, was as follows :—

Freehold and Mineral Rights	111,875 acres
Mineral Rights only, of which 1,334 acres are not registered in the name of the Company	3,436,013 acres

together with interests in other Companies in sundry freehold and mineral rights in the Pilgrims Rest and Rustenburg districts of the Transvaal and the freehold of 33,221 acres of residential plots in townships, sold in leasehold, in the Johannesburg Municipal Area.

The total area of farm land sold was 5,360 acres, the mineral rights were acquired over 6,747 acres, and one leasehold stand was converted to freehold.

SHARES AND DEBENTURES—These investments stood at a book value of £393,905, a net increase of £24,448 compared with the total at the end of the previous year. All shares appeared in the books at or under cost, but in no case above Stock Exchange valuation or Directors' valuation where not quoted at 31st December, 1952. The valuations of these investments largely exceeded the book value shown in the Balance Sheet.

MINERAL INTERESTS.

Tributes—The royalties derived from properties let on tribute totalled **£89,552** mainly in respect of the working of asbestos, chrome and tin deposits.

During the year the Company concluded tributing agreements in respect of tin on portion of the farm Roodepoort No. 813, Potgietersrust, and mica on the farms Excellence No. 309 and Parsons No. 310, Letaba. Negotiations are proceeding with the tributor of the farm Penge No. 304, Lydenburg, whereby, subject to an upward adjustment in the royalty formula, the period of the lease will be extended so that the tributor will enjoy greater security of tenure.

Platinum Prospecting Association No. 3—This Association, in which the Company has a 45 per cent interest, continued the underground exploration of the Boschkoppie property during the year. The necessary buildings have been erected and plant is installed. A satisfactory amount of incline shaft sinking and lateral development has been done, but no definite conclusions have yet been reached regarding the future of the property.

Rietfontein (T.C.L.) Mine—The property remained on a caretaking basis.

OPERATIONS.

Van Dyks Drift Colliery—The quality of coal produced during the year has remained good and mining conditions generally have been normal.

Due to inadequate railway facilities the Colliery, as during last year, operated on a restricted output, which it was possible to produce mainly from only five of six available districts. Owing to the Government embargo on the export of coal which continued in force until the end of the year, only a very small tonnage of shipment coal was despatched by the Colliery.

With effect from 27th June, 1952, the Price Controller fixed the maximum price at which coal may be sold on the inland market by Transvaal and Orange Free State producers at 5s. 10d. per ton of 2,000 lb. for duff, and for all other sizes at 8s. 10d. per ton for coal of a calorific value not exceeding 12 lb./lb. and at 9s. 3d. per ton for coal of a calorific value exceeding 12 lb./lb.

Capital expenditure during the year amounted to **£17,475.**

CASH AND INVESTMENTS

The net Cash and Cash Assets at the end of the year amounted to made up as follows :—			£293,573
Mortgage Bonds and other Securities			£39,817
Plant, Stores, etc.			54,052
Debtors and Payments in Advance			65,851
			£159,720
Deposits, Cash, etc.		£347,144	
Less : Liabilities (other than those of a contingent nature)	£199,077		
Abnormal Costs Reserve—			
Van Dyks Drift Colliery	14,214		
		213,291	
			133,853
			£293,573

PROFITS AND APPROPRIATIONS

Balance Unappropriated as per Balance Sheet, 31st December, 1951		£343,265
Balance of Profit and Loss Account for the year ended 31st December, 1952		185,108
Transfer from Shareholders Contingency Reserve		4,700
		£533,073
This amount has been dealt with as follows :		
Taxation	£46,174	
Dividend No. 30 of 1s. 9d. per share	81,396	
Forfeited Dividends Account	4,739	
		132,309
Leaving a balance unappropriated of		£400,764

The full Report and Accounts may be obtained from the London Secretaries, A. MOIR & CO., 4 London Wall Buildings, E.C.2.

AIR PILOT (25), requires position with mining company, home or overseas. Available May. Box No. 533.

RAND MINES, LIMITED

(Incorporated in the Union of South Africa)

BALANCE SHEET, 31st DECEMBER, 1952

CAPITAL AND LIABILITIES

Share Capital—Registered 2,200,000 Shares of 5s. each, £550,000. Less 49,005 Shares of 5s. each in reserve, £12,251. **Issued—2,150,995 Shares of 5s. each**	£537,749
Investment Reserve—As per Balance Sheet, 31st December, 1951, £4,958,748. **Less—**Amount written off Investments and Freehold Properties after deducting the amount realized by the sale of Investments during the year less book value thereof £211,745	4,747,003
Shareholders—Dividends declared but unpaid, £380,031. Contingency Reserve pending claims for dividends forfeited since September, 1939, £63,511. **Trustees of the Corner House Pension Fund,** £880,000. **Creditors and Provisions,** £365,926	1,689,468
Exploration Reserve—As per Balance Sheet, 31st December, 1951, £346,673. Less—Expenditure on Ventures charged thereto, £30,468	316,205
Appropriation Account—Balance Unappropriated	1,878,008
Contingent Liabilities There are Contingent Liabilities as under, viz :—I.—To finance and to subscribe for shares in certain undertakings. II.—To guarantee housing loans to employees. III.—For contracts open for the supply of Stores, etc. IV.—To guarantee commitments of associated Companies.	
	£9,168,433

PROPERTY AND ASSETS

Freehold Properties and Ventures at cost *less* depreciation	£17,919
Shares, Debentures, etc., at or below cost but not exceeding Stock Exchange valuation, or Directors' valuation, where not quoted	5,972,390
Shares in Subsidiary Companies, at or below cost, but not exceeding Directors' valuation	42,888
Plant, Stores, Vehicles, Furniture, etc., at cost *less* depreciation	38,273
Advances to Subsidiary Companies	45,300
Debtors, Loans and Payments in Advance, etc.	193,794
Deposits, Fixed and on Call	1,485,789
Government, Municipal and Public Utility Stocks and Debentures —to offset deposits made by the Trustees of The Corner House Pension Fund	974,023
Cash at Bankers and in Hand	33,451
Dividends to be received on Shareholdings	364,606
	£9,168,433

APPROPRIATION ACCOUNT

Taxation	£39,161	**Balance Unappropriated—** As per Balance Sheet, 31st December, 1951	£1,743,566
Forfeited Dividends Account	41,989	**Balance of Profit and Loss Account—** For the year ended 31st December, 1952	818,901
Dividend Account— Dividend No. 98 of 3s. per share declared 12th June, 1952, £322,649. Dividend No. 99 of 3s. per share, declared 11th December, 1952, £322,649	645,298	**Transfer from Shareholders Contingency Reserve**	41,989
Balance Unappropriated— 31st December, 1952—Carried to Balance Sheet	1,878,008	NOTE. — The Accounts have been drawn up in accordance with the normal practice of the Company; an amount of £211,745 being the amount written off Investments and Freehold Properties after deducting the amount realized by the sale of Investments during the year less book value thereof has been dealt with through the Investment Reserve shown in the Balance Sheet.	
	£2,604,456		£2,604,456

The full Report and Accounts may be obtained from the London Secretaries, A. Moir & Co., 4 London Wall Buildings, London, E.C.2.

GOLD AND BASE METAL MINES OF NIGERIA LIMITED

The Directors of Gold and Base Metal Mines of Nigeria Limited announce that a Contract has been signed with the Defense Materials Procurement Agency of the United States Government for advances to be made to the Company, in sterling, up to a maximum of £250,000, such advances to be used to develop the Company's columbite producing areas in the Liruien Kano district of Northern Nigeria. The advances may be drawn up to June 30, 1954. Repayments, commencing thereafter and ending in 1956, will be made in columbite concentrates.

The Company has already signed a Contract with the Defense Materials Procurement Agency for the sale of its columbite concentrates, in the first instance up to December 31, 1953.

JOHANNESBURG CONSOLIDATED INVESTMENT CO., LTD.

(Incorporated in the Union of South Africa)

MINING COMPANIES' REPORTS FOR QUARTER ENDED MARCH 31, 1953

GENERAL REMARKS—The revenue from gold has been calculated on the basis of gold at 247s. 4d. per f.oz. for January, 246s. 8d. for February, and 246s. 10d. for March, 1953.

In determining the payable development footage gold has been taken at 248s. 3d. per f.oz.

The development figures are the actual results of the sampling of development work on reef : no allowance has been made for modifications which may be necessary when computing the ore reserves. 10 and 11 Austin Friars, London, E.C.2. April 23, 1953.

THE EAST CHAMP D'OR GOLD MINING CO. LTD.

(Incorporated in the Union of South Africa)
ISSUED CAPITAL.....**£259,875**
Crushed **76,000** tons ; yielding **12,436** f.oz. gold

	£	Per ton crushed s. d.	Per f.oz. gold produced s. d.
Revenue from Gold	**153,554**	**40 5**	
Working Costs	**143,568**	**37 9**	**230 11**
	9,986	**2 8**	
Sundry Revenue	**1,227**		
Profit for Quarter	**11,213**		

In addition to the above, **£3,448** accrued during the quarter in respect of increased revenue from sales of gold at enhanced prices.

Taxation for the quarter is estimated at **£2,999.**

The expenditure on Capital Account amounted to **£168.**

The **DEVELOPMENT FOOTAGE** sampled totalled **760** ft., and gave the following results : **PAYABLE, 535** ft., having an average value of **7.2** dwt. over **33** in. **UNPAYABLE, 225** ft., having an average of **2.0** dwt. over **35** in.

GOVERNMENT GOLD MINING AREAS (MODDERFONTEIN) CONSOLIDATED LTD.

(Incorporated in the Union of South Africa)
ISSUED CAPITAL.....**£1,400,000**
Crushed **726,000** tons : yielding **98,148** f.oz. gold

	£	Per ton crushed s. d.	Per f.oz. gold produced s. d.
Revenue from Gold	**1,211,878**	**33 5**	
Working Costs	**1,051,337**	**29 0**	**214 3**
	160,541	**4 5**	
Sundry Revenue	**19,680**		
Profit for Quarter	**180,221**		

In addition to the above, **£27,840** accrued during the quarter in respect of increased revenue from the sales of gold at enhanced prices.

The Government's share of profits for the quarter is estimated at **£42,891.**

PYRITE RECOVERY PLANT—Expenditure during the quarter in connection with the Pyrite Recovery Plant totalled **£268,** making a total to date of **£1,853.**

DEVELOPMENT—The **DEVELOPMENT FOOTAGE** sampled totalled **2,955** ft., and gave the following results : **PAYABLE, 1,735** ft., having an average value of **4.9** dwt. over **45** in. **UNPAYABLE, 1,220** ft., having an average value of **2.1** dwt. over **46** in.

NEW STATE AREAS, LTD.

(Incorporated in the Union of South Africa)
ISSUED CAPITAL.....**£1,514,037**
Crushed **106,000** tons ; yielding **15,819** f.oz. gold

	£	Per ton crushed s. d.	Per f.oz. gold produced s. d.
Revenue from Gold	**195,345**	**36 10**	
Working Costs	**197,514**	**37 3**	**249 9**
	2,169	***0 5***	
Sundry Revenue	**5,271**		
Profit for Quarter	**3,102**		

In addition to the above, **£5,206** accrued during the quarter in respect of increased revenue from the sales of gold at enhanced prices.

(Note.—There was no liability in respect of Government's share of profits or taxation for the quarter.)

The **DEVELOPMENT FOOTAGE** sampled totalled **1,224** ft., and gave the following results : **PAYABLE, 554** ft., having an average value of **14.1** dwt. over **20** in. **UNPAYABLE, 670** ft., having an average value of **4.1** dwt. over **16** in.

THE RANDFONTEIN ESTATES GOLD MINING CO., WITWATERSRAND, LTD.

(Incorporated in the Union of South Africa)
ISSUED CAPITAL.....**£4,063,553**
Crushed **920,000** tons ; yielding **119,391** f.oz. gold

	£	Per ton crushed s. d.	Per f.oz. gold produced s. d.
Revenue from Gold	**1,474,203**	**32 1**	
Working Costs	**1,399,071**	**30 5**	**234 4**
	75,132	**1 8**	
Sundry Revenue	**15,242**		
Profit for Quarter	**90,374**		

In addition to the above, **£35,088** accrued during the quarter in respect of increased revenue from sales of gold at enhanced prices.

(Note.—There was no liability in respect of taxation for the quarter.)

The expenditure on Capital Account amounted to **£2,139.**

URANIUM PROJECT—Expenditure during the quarter in connection with the Uranium Project amounted to **£370,579,** making a total to date of **£896,544 ;** the Uranium Loan, together with the accrued interest, totalled **£1,060,019** at March 31, 1953.

Work on the Project is proceeding.

DEVELOPMENT—The **DEVELOPMENT FOOTAGE** sampled totalled **5,600** ft., and gave the following results : **PAYABLE, 2,855** ft., having an average value of **6.4** dwt. over **45** in. **UNPAYABLE, 2,745** ft., having an average value of **1.8** dwt. over **45** in.

ANGLO AMERICAN CORPORATION OF SOUTH AFRICA, LTD.

(Incorporated in the Union of South Africa)

NOTICE TO HOLDERS OF ORDINARY SHARE WARRANTS TO BEARER

PAYMENT OF COUPON No. 36

With reference to the notice of declaration of dividend published in the Press on March 27, 1953, the following information is published for the guidance of holders of Share Warrants to Bearer:

The DIVIDEND on shares represented by SHARE WARRANTS TO BEARER will be PAID on or after May 19, 1953, after surrender of the appropriate coupons at BARCLAYS BANK (DOMINION, COLONIAL & OVERSEAS), Circus Place, London Wall, London, E.C.2, where listing forms may be obtained.

Coupons must be left four clear days for examination and may be presented any day (Saturdays excepted) between the hours of 11 a.m. and 2 p.m.

Coupons may also be presented for payment in French currency at Banque de l'Union Parisienne, 6 and 8, Boulevard Haussmann, Paris 9e, or in Belgian currency at Banque Lambert, 2, rue d'Egmont, Brussels.

Union of South Africa Non-resident Shareholders' Tax will be deducted at the rate of 6.225 per cent from the dividend payable in respect of all Share Warrant coupons. United Kingdom Income Tax will also be deducted from Coupons presented for payment at Barclays Bank (D.C. and O.), London, unless Coupons are accompanied by Inland Revenue declarations. Where such deduction is made, the net amount of the dividend will be 2s. 7.944d. per share, viz.:

	Per share s.	d.
Amount of Dividend declared	4	0
Less: South African Non-resident Shareholders' Tax at 1s. 2.94d. in the £		2.988
	3	9.012
Less: United Kingdom Income Tax at 4s. 6d. in the £ on the Gross amount of the dividend of 4s. 10.08d.	1	1.068
Net amount	2	7.944

By Order of the Board,
W. E. GROVES, London Secretary.

London Office:
11, Old Jewry, E.C.2.
April 23, 1953.

NOTE.—The Corporation has been requested by the Commissioners of Inland Revenue to state:

Under the provisions of Section 348 and the 17th Schedule of the Income Tax Act, 1952, relating to "unilateral relief" from double taxation, South African tax applicable to the dividend is allowable as a credit against the United Kingdom tax payable in respect of the dividend. The deduction of tax at the reduced rate of 4s. 6d. in the £ instead of at the standard rate of 9s. in the £ represents a *provisional* allowance of credit at the rate of 4s. 6d. in the £. The final rate of credit allowable to a particular shareholder depends on his personal rate of tax; it may be more or less than 4s. 6d. in the £. Revision of the credit involves a corresponding adjustment of the amount shown above as the gross amount of the dividend for United Kingdom tax purposes.

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NOTICE TO HOLDERS OF STOCK WARRANTS TO BEARER

PAYMENT OF COUPON No. 33

With reference to the notice of declaration of dividend advertised in the Press on March 26, 1953, the dividend on stock represented by stock warrants to bearer will be paid on or after May 15, 1953, upon surrender of Coupon No. 33 at Barclays Bank (Dominion, Colonial and Overseas), Circus Place, London Wall, London, E.C.2, where listing forms may be obtained.

Coupons may also be presented for payment in French currency at Banque de l'Union Parisienne, 6 and 8, Boulevard Haussmann, Paris 9e.

Coupons presented at Barclays Bank (Dominion, Colonial and Overseas) must be left four clear days for examination and may be presented any day (Saturday excepted) between the hours of 11 a.m. and 2 p.m.

United Kingdom Income Tax as indicated hereunder will be deducted from dividends payable in respect of stock warrant coupons presented for payment in London unless accompanied by Inland Revenue declarations. Where such deduction is made, the net amount of the dividend will be 1s. 0.774d. per 10s. unit of stock, viz.:

	per 10s. unit of stock s.	d.
Declared dividend	1	6
Less United Kingdom Income Tax at 4s. 6d. in the £ on the Gross amount of the dividend of 1s. 11.226d.		5.226
Net dividend	1	0.774

For and on behalf of
ANGLO AMERICAN CORPORATION OF SOUTH AFRICA LIMITED.
Registrars and Transfer Agents in England,
G. E. SIMMONDS,
Assistant London Secretary.

11, Old Jewry,
London, E.C.2.
April 23, 1953.

NOTE.—The London Paying Agents have been requested by the Commissioners of Inland Revenue to state:

Under the provisions of Section 348 and the 17th schedule of the Income Tax Act, 1952, relating to "Unilateral Relief" from Double Taxation, Northern Rhodesian tax applicable to the Dividend is allowable as a credit against the United Kingdom tax payable in respect of the Dividend.

The deduction of tax at the reduced rate of 4s. 6d. in the £ instead of at the standard rate of 9s. in the £ represents a *provisional* allowance of credit at the rate of 4s. 6d. in the £. The final rate of credit allowable to a particular Stockholder depends on his personal rate of tax; it may be more or less than 4s. 6d. in the £. Revision of the credit involves a corresponding adjustment of the gross amount of the Dividend for United Kingdom tax purposes.

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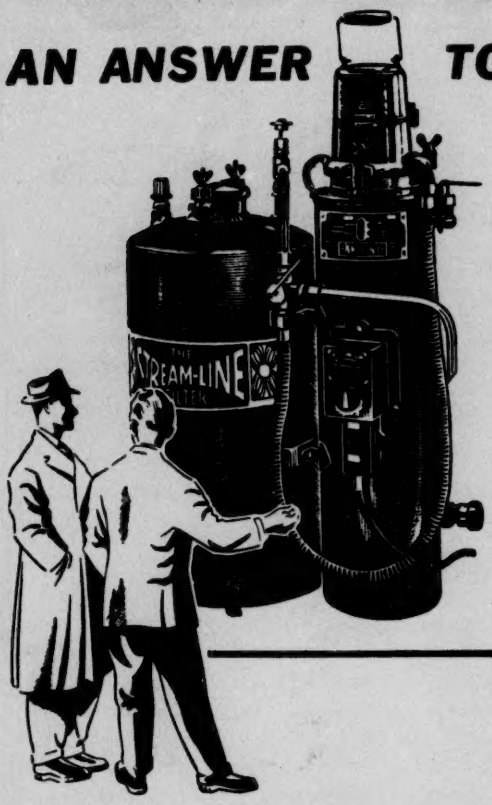

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